PROJECT MANUAL

CD Package

28 February 2020

Volume 1 of 2
Divisions 00 - 14

CHRISTUS

CHRISTUS Spohn Health System
Emergency Department Expansion & Renovation
CHRISTUS Spohn Hospital - South

Corpus Christi, Texas

CLK Project Number: 201955
PROJECT MANUAL

CHRISTUS Spohn Health Systems
CHRISTUS Spohn Hospital - South

Emergency Department Expansion & Renovation
Corpus Christi, Texas

28 February 2020

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1.1 LIST OF DRAWINGS


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G002 ADA – TAS 2012 REQUIREMENTS
G110 INTERIOR PARTITION TYPE SCHEDULES
G120 INTERIOR PARTITION DETAILS

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C100 CIVIL COVER & GENERAL NOTES
C101 SITE DEMOLITION PLAN
C201 GENERAL DIMENSION AND JOINTING PLAN
C202 GRADING PLAN
C203 GRADING PLAN
C204 UTILITY PLAN
C301 POLLUTION PREVENTION PLAN
C302 CITY STANDARD POLLUTION PREVENTION PLAN DETAILS
C401 PAVING DETAILS
C402 SANITARY SEWER DETAILS
C403 STORM SEWER DETAILS
C404 ACCESSIBLE & SIGNAGE DETAILS

DEMOLITION
D111 DEMOLITION PLAN
D112 DEMOLITION RCP
ARCHITECTURAL

A001  ARCHITECTURAL SITE PLAN
A011  SITE DETAILS
A111  REFERENCE PLAN & MECH PLATFORM PLAN
A112  FLOOR & MECH PLATFORM DIMENSION PLAN /WALL & DOOR TAGS
A113  REFLECTED CEILING PLAN & MECH PLATFORM RCP
A190  ROOF PLAN & MECH PENTHOUSE PLAN
A201  EXTERIOR BUILDING ELEVATIONS
A301  BUILDING/WALL SECTIONS
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A611  INTERIOR FINISH PLAN
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A810  ENLARGED PLANS & INT. ELEV. – ISO RM 168 & DECONTAM RMS
A811  INTERIOR ELEVATIONS
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A901  TYPICAL MILLWORK DETAILS
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S403  TYPICAL FOUNDATION DETAILS
S405  FOUNDATION DETAILS
S406  FOUNDATION DETAILS
S415  TYPICAL METAL STUD DETAILS

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E001 ELECTRICAL NOTES AND SCHEDULES
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PT-301 STATION DETAILS
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SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

A. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Contractor duties.
   4. Work by Owner.
   5. Work under separate contracts.
   6. Future work.
   7. Owner-furnished products, Contractor-installed.
   8. Access to site.
   9. Protection of persons, work, and property.
   10. Coordination with occupants.
   11. Work restrictions.

B. Related Requirements:
   1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

   1. Project Location: 5950 Sartoga Blvd, Corpus Christi, Texas 78414.

B. Owner: CHRISTUS Spohn Health System, 919 Hidden Ridge Drive, Irving, Texas 75038.
   1. Owner's Representative: Mark Casanova.


D. Contractor: To be determined through RFP process for this Project.
1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Single story building expansion of approximately 12,000 square feet in size & renovation of existing emergency suite of approximately 5,900 square feet in size, Institutional (I-2) occupancy, Type I-A construction type, and fully sprinkled.

B. Type of Contract:
   1. Project will be constructed under a single prime contract.
   2. Project will be constructed under a general construction contract, AIA Standard form Agreement between Owner & Contractor for a Stipulated Sum, as amended by CHRISTUS Health.

1.5 CONTRACTOR DUTIES

A. VOC Compliance: Ensure that all assemblies, components, and systems comply with all VOC (Volatile Organic Components) requirements and regulations of the Environmental Protection Agency (EPA) Occupational Safety Health Administration (OSHA), State, County, City, and Local Air Control District.

B. Except as specifically noted, provide and pay for:
   1. Labor, materials, and equipment.
   2. Tools, construction equipment and machinery.
   4. Other facilities and services necessary for proper execution and completion of work.

C. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:
   1. Building Permit.
   2. Licenses.

D. Give required notices.

E. Comply with all applicable local Building Codes, Texas Windstorm Insurance Construction codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.

F. Promptly submit written notice to Architect of observed variance of Contract Documents from requirements of authorities having jurisdiction. Assume responsibility for Work performed without such notice known to be contrary to code or regulatory requirements.

1.6 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
   1. Furniture, Fittings and Equipment (FF&E).
2. Telephone System.
4. Fixed Medical Equipment.

C. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
1. Placement of movable Medical equipment.

1.7 WORK UNDER SEPARATE CONTRACTS

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

B. Concurrent Work: Owner may award and will assign to Contractor separate contract(s) for construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

C. Subsequent Work: Owner may award separate contract(s) for additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1.8 FUTURE WORK

A. The Contract Documents include requirements that will allow Owner to carry out future work following completion of this Project.

1.9 OWNER-FURNISHED PRODUCTS, CONTRACTOR-INSTALLED

A. Owner will furnish products indicated in Documents. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

B. Owner-Furnished Products:
1. Reference Information included Construction Documents

C. Owner Responsibilities: For Owner-furnished, Contractor-installed products, the Owner will:
1. Arrange for Shop Drawings, Product Data, and Samples and deliver to the Contractor
2. Arrange and pay for delivery of Owner-furnished items according to Contractor's construction schedule
3. Inspect delivered items for damage.
4. Arrange for replacement of Owner-furnished items that are damaged, defective, or missing.
5. Arrange for manufacturer's field services for delivery of manufacturer's warranties to the Contractor.
6. Furnish the Contractor the earliest possible delivery date for Owner-furnished products.

D. Contractor Responsibilities: For Owner-furnished, Contractor-installed products, the Contractor shall:
1. Provide support systems to receive Owner's equipment as well as provide plumbing, HVAC, and electrical connections.
2. Be present for delivery and assist the Owner's inspection.
3. Use Owner-furnished delivery dates in Contractor's construction schedule.
4. Review Shop Drawings, Product Data, Samples, and other Submittals, and return to the Architect, noting discrepancies or anticipated problems regarding incorporation of the product.
5. Be responsible for receiving, unloading, handling, and storing Owner-furnished items at Project site.
6. Protect Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
7. Repair or replace items damaged as a result of Contractor's operations with new items matching originally specified items.
8. Install and incorporate Owner-furnished items into the work, in accordance with manufacturer's installation instructions, and make building utility services connections.

1.10 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project and as noted on project phasing plan.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section and by Owner's right to perform work or retain other contractors on portions of the project.
1. Confine operations at Project site to areas permitted by law, ordinances, permits, and Contract Documents.
2. Do not unreasonably encumber site with materials or equipment that hinder's access.
3. Protect and keep safe products stored on premises.
4. Products and materials are to be stored so as to not interfere with operations of Owner or other contractors.
5. Obtain and pay for use of additional storage or work areas needed for operations.

C. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limit use of site for work and storage as follows:
   a. Do not use existing/completed paved areas for storage without Owner’s approval.
   b. Do not store materials within 25 feet of new or existing trees.
   c. Restrict Work and storage to areas indicated on Drawings or approved by Owner.
   d. Limit site access to locations approved by Owner.
   e. Restrict parking to areas approved by Owner.
   f. Do not perform operations that would interrupt or delay Owner's daily operations.
   g. Maintain a clear path from helipad to existing Emergency Department emergency entrance.
h. Coordinate placement of crane during construction with Halo-Flight and other users of helipad.

2. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet (12.2 m) beyond building perimeter; 10 feet (3 m) beyond surface walkways, patios, surface parking, and utilities less than 12 inches (300 mm) in diameter; 15 feet (4.5 m) beyond primary roadway curbs and main utility branch trenches; and 25 feet (7.6 m) beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

3. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.11 PROTECTION OF PERSONS, WORK, AND PROPERTY

A. The Contractor shall maintain adequate protection of the Work from damage and shall protect the Owner's and adjacent property from injury or loss arising from the Work. Contractor shall provide and maintain at all times OSHA-required danger signs, guards, and obstructions necessary to protect the public and construction personnel from any dangers inherent with or created by the construction of the Work.
   1. All federal, state, and city rules and requirements pertaining to safety, and all EPA standards, OSHA standards, and NESHAP regulations pertaining to asbestos and other hazardous materials, shall be complied with.

B. Twenty-four Hour Call: The Contractor shall have personnel on call 24 hours per day for emergencies during the course of the Project. The Owner shall be provided with a 24-hour emergency contact number of Contractor's personnel. Contractor shall be able to respond to any emergency call and have personnel on-site within 2 hours after contact. Numbers to be made available to the Owner shall include home, office, and mobile numbers for the following:
   1. Contractor's project manager.
   2. Contractor's field superintendent.
   3. Owner or company officer of Contractor.

1.12 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
   1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before inspection by Texas Department of State Health Services.

3. Before inspection by Texas Department of State Health Services, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.

4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.13 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated.
   1. Weekend Hours: 8:00 a.m. – 5:00 p.m.
   2. Early Morning Hours: See City of Corpus Christi requirements for allowable early start times and restrictions on maximum decibels allowed.
   3. Hours for Utility Shutdowns: During normal construction hours.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Architect & Facility Maintenance not less than three days in advance of proposed utility interruptions.
   2. Obtain Facility Maintenance written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Architect, Facility Maintenance Manager, and Owner not less than three days in advance of proposed disruptive operations.
   2. Obtain Facility Maintenance written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is NOT permitted within the building or on construction site.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is NOT permitted.

G. Employee Identification: Provide means to identify Contractor personnel working on Project site. Type of identification will be determined in consultation with Owner & Facility Maintenance, & facility Security teams. Personnel to be identified at all times while on site.

H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
   1. Maintain list of approved screened personnel with Owner's representative.
1.14 SPECIFICATION AND DRAWING CONVENTIONS

A. Specifications Format: The Specifications are organized into Divisions and Sections using CSI/CSC's "MasterFormat 2014" 50-Division format and numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence, without all numbers included in the sequence. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

2. The order of articles, paragraphs, subparagraphs, and sub-subparagraphs within the text of any Specification section is defined by a sequence of indentations.
   a. Article, paragraph and subparagraph titles, and other identifications of subject matter in the Specifications, are intended as an aid in locating and recognizing various requirements in the beginning words of a sentence.
   b. Specification text shall govern over titling, and shall be understood to be interpreted as a whole. Where a title establishes the subject, the titles are subordinate to and do not define, limit, or otherwise restrict the Specification text.

3. The captions and headings of various subdivisions of the Contract Documents are intended only as a matter of reference and convenience for describing the Work and in no way define, prescribe, or limit the scope or intent of the Contract Documents or any subdivision thereof.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
   a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   b. Contract Documents may omit modifying words such as “all” or “any,” and articles such as “the” or “an.” The absence of a modifier or article from one statement that appears in another is not intended to affect the interpretation of either statement.

3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

4. The Specifications do not:
   a. Establish trade jurisdictions or divisions of responsibility.
   b. Do not define subcontract scopes of work.
C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Work specified in any one Section is related to, and dependent upon, Work specified in other Sections, whether or not specific reference is made to the Work of other Sections. Cross-references in the Specifications are general references intended as a matter of convenience for aiding in the location general information, and are not all-inclusive.

E. Names, telephone numbers, and website addresses and other contact information listed in the Contract Documents are for convenience only, are subject to change, and are believed to be accurate and up-to-date as of the printing of the Contract Documents.

F. Use of the word “including,” when following any general statement, shall not be construed to limit such statement to specific items or matters listed, whether or not non-limiting language (such as “without limitation,” “but not limited to,” or other words of similar import) is used with reference thereto; but rather, shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement.

G. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.15 PROVISIONS FOR ELECTRONIC MEDIA

A. Digital Data Files: Electronic drawing/model files of the Contract Drawings will not be furnished by Architect for Contractor's use in preparing submittals unless procedures stated within Section 01 33 00 – “Submittal Procedures” (and the Appendix A attached thereto) are agreed to and Contractor executes the Agreement Form, and the Contractor properly prepares and submits the Submittals Schedule as indicated in Division 01 Section "Construction Progress Documentation."

B. For the duration of this project, it is the intent to distribute information only in electronic format where allowable. Drawings, memoranda, letters or other documents issued in the normal course of the work will be issued in electronic format (.pdf).
   1. Costs associated with printing and distribution of the project information is included in the Contract amount.
   2. Printed documents will be provided and expected only for documents that are required to be in paper format by this contract or other legal requirement.
   3. Drawings that require revision will be issued as full-size sheet replacements, and complete specification sections will be reissued.

C. Construction Administration Using Project Management Software: Contractor may utilize Newforma Project Center project information management software or
another information management software product that is agreed to by Architect and Owner, for purposes of managing project communication and documentation until Final Completion. Project Management Software shall include the following functions:

1. Project directory.
2. Project correspondence.
3. Distribution of OAC meeting minutes.
4. Tracking and logging of Requests for Information (RFI’s).
5. Distribution of Architect’s Supplemental Instructions, complete with updates to affected construction documents.
6. Issuance of Proposal Requests, complete with proposed revisions to affected construction documents.
7. Processing of Contract Document Modifications, complete with appropriate back-up documentation.
8. Distribution, tracking, and logging of Submittals to ensure timely and verifiable submission and review.
10. Submission of draft and final copies of Applications for Payment.
11. Distribution of testing agency reports.
12. Requests for, and response to, inspections from authorities having jurisdiction.
14. Transmitting Contractor punch lists to Owner and Architect.
15. Maintain a project calendar, where events, meetings, milestones, etc., can be identified and accessed by team members.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00
SECTION 01 21 00

ALLOWSANCES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

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

B. Types of allowances include the following:
   1. Lump-sum allowances.
   2. Unit-cost allowances.
   3. Quantity allowances.
   4. Contingency allowances.
   5. Testing and inspecting allowances.

C. Related Requirements:
   1. Section 01 26 00 "Contract Modifications" for change orders incorporating allowances.
   2. Section 01 29 00 "Payment Procedures" for incorporating alternates into the Schedule of Values.
   3. Section 01 40 00 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
   4. Section 01 60 00 "Product requirements" for product selection procedures.
   5. Divisions 02 through 51 Sections for items of Work covered by allowances.

1.3 DEFINITIONS

A. Allowance Expenditure Authorization (AEA): Form signed by Architect, Owner, and Contractor authorizing Contractor to proceed with a predetermined item of work, for an agreed-upon price. Cost of work charged to Cash or Contingency Allowance does not change Contract Sum.

1.4 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.

1.5 ACTION SUBMITTALS
A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Proposal Request.

1.6 INFORMATIONAL 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. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

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

1.8 LUMP-SUM, UNIT-COST, AND QUANTITY ALLOWANCES
A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes not specifically exempted by Project's tax exempt status, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Contractor's costs for receiving and handling at Project site, labor, installation, overhead, profit, and similar costs for related to products, and equipment ordered by Owner under allowance shall be included in the allowance and are not part of the Contract Sum. These costs include taxes not specifically exempted by Project's tax exempt status, freight, and delivery to Project site, insurance, equipment rental, and similar costs.

D. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.
1.9 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor will be authorized to perform work covered by Owner’s Construction Contingency Allowance only upon the Architect’s issuance, and the Architect’s and Owner’s execution, of an Allowance Expenditure Authorization (AEA).

C. Use of the Owner’s Construction Contingency Allowance will not be authorized to cover costs for the following:
   1. Errors or omissions in Contractor’s bid.
   2. Contractor's change or replacement of subcontractor or supplier.
   3. Contractor's failure to carry out the Work.
   4. Correction or replacement of nonconforming Work.
   5. Correction or replacement of damaged Work.
   6. Correction or replacement of existing construction damaged by Contractor’s operations.
   7. Acceleration or overtime to recover time lost due to any of the above.

D. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation taxes not specifically exempted by Project's tax exempt status, insurance, equipment rental, and similar costs.

E. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

F. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.10 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.11 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
   1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
   2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

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

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

3.3 **SCHEDULE OF ALLOWANCES**
   A. Allowance No. 1: Unit-Cost Allowance: Include the sum of $32,000 for internally lite exterior signage.
   B. Allowance No. 2: Unit-Cost Allowance: Include the sum of $30,000 for TAS approved interior signage & way finding in unit.
   C. Allowance No. 3: Contingency Allowance: Include a contingency allowance of two (2) percent of construction cost for use according to Owner's written instructions.
   D. Allowance No. 4: Testing and Inspection Allowance: Include the sum of $54,000.00 for material testing as required in contract documents.
   E. Allowance No. 5: Televisions and Mounting: Include the sum of $33,000.00 for use in purchase of television and mounting devices.
F. Allowance No. 6: Cable TV: Include the sum of $8,000 for use to install cable TV in Emergency Department.

G. Allowance No. 7: Allowance of $25,000 for modifications & additions of structural steel, fabrication and erection.

H. Allowance No. 8: Allowance of $15,000 for modifications to cold formed framing.

I. Allowance No. 9: Allowance of $20,000 for site landscaping and irrigation.

END OF SECTION 01 21 00
SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for alternates.

1.3 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. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. 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.

1.4 PROCEDURES
A. Coordination: Revise 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 revisions 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

A. Alternate No. 1 Terrazzo Flooring: Contractor to include in its bid amount the cost to provide Terrazzo flooring in lieu of flooring shown in base bid for Airlock 101, Waiting 102, Hall 103, and Vending Alcove. Refer to Architectural Drawings for more information on alternate.

END OF SECTION 01 23 00
SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for submitting and processing requests for product substitutions after the bid.
B. Related Requirements:
1. Section 01 21 00 "Allowances" for products selected under an allowance.
2. Section 01 23 00 "Alternates" for products selected under an alternate.
3. Section 01 26 00 "Contract Modification Procedures" for determining which modification method and forms are appropriate.
4. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

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

1.4 ACTION SUBMITTALS
A. 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. Substitution Request Form: Use form provided at the end of this Section.
   a. Requests for substitution will not be reviewed if submitted on an incorrect form.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination information, including a list of changes or revisions 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. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for Project, from model code organization acceptable to the authorities having jurisdiction.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. 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.

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


b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider 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:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Requested substitution provides sustainable design characteristics that specified product provided.
   c. Substitution request is fully documented and properly submitted.
   d. Requested substitution will not adversely affect Contractor's construction schedule.
   e. Requested substitution has received necessary approvals of authorities having jurisdiction.
   f. Requested substitution is compatible with other portions of the Work.
   g. Requested substitution has been coordinated with other portions of the Work.
   h. Requested substitution provides specified warranty.
   i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

C. Substitutions for Convenience: The Architect will consider requests for substitution received at least 30 days prior to the date the proposed substitution is required to be incorporated into the Work. Requests for substitution received fewer than 30 days prior to the date the proposed substitution is required to be incorporated into the Work may be considered or rejected at the discretion of the Architect.

1. Conditions: Architect will consider 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:
   a. 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.
b. Requested substitution does not require extensive revisions to the Contract Documents.

c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Requested substitution provides sustainable design characteristics that specified product provided.

e. Substitution request is fully documented and properly submitted.

f. Requested substitution will not adversely affect Contractor's construction schedule.

g. Requested substitution has received necessary approvals of authorities having jurisdiction.

h. Requested substitution is compatible with other portions of the Work.

i. Requested substitution has been coordinated with other portions of the Work.

j. Requested substitution provides specified warranty.

k. 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.

2.2 ATTACHMENTS

A. Post-Award Substitution Request Form.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00
SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
   B. Related Requirements:
      1. Section 01 21 00 "Allowances" for procedural requirements for handling and processing allowances.
      2. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
      3. Section 01 31 00 “Project Management and Coordination for Requests for Interpretation” for administrative procedures for handling RFIs.

1.3 MINOR CHANGES IN THE WORK
   A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect’s Supplemental Instructions." or substantially similar form generated by the Architect.

1.4 PROPOSAL REQUESTS
   A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
      1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
      2. Contractor’s Action: Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
         a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
         b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
         c. Include separate costs of labor, materials, equipment and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include separate costs of labor, materials, equipment and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.


1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.6 CHANGE ORDER PROCEDURES


1.7 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00
SECTION 01 29 00
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 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
B. Related Requirements:
   1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
   2. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   3. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

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

1.4 SCHEDULE OF VALUES
A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule.
   1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms AIA G-702 with continuation sheets AIA G-703.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.
B. Format and Content: Use Project Manual table of contents 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. Architect’s project number.
   d. Contractor’s name and address.
   e. Date of submittal.

2. Submit draft schedule of values using AIA Document G 703 Continuation Sheets.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      1) Labor.
      2) Materials.
      3) Equipment.

   a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance or bonded warehouse.

7. Provide separate line items in the Schedule of Values for each part of the Work where Applications for Payment may include cost of submittals.
   a. Cost for submittals shall represent true cost of submittals preparation, as evidenced by subcontractor invoices, but not to exceed 5 percent of the total value of that item of work line item.
   b. For major items, provide separate line items for materials and labor. Major items include, but are not limited to,
      1) Earthwork
      2) Paving
      3) Drilled Piers
      4) Concrete beams and slab
      5) Masonry
PAYMENT PROCEDURES

8. 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.

9. 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.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. In addition to line-item costs of Work specified in Sections in Divisions 02-39, furnish line-item costs for each of the following general administrative and procedural cost items:
   a. Bonds (If Required or Requested in RFP)
   b. Insurance
   c. Mobilization
   d. Field superintendence
   e. Temporary facilities
   f. Trench safety
   g. Cleanup and disposal
   h. Project closeout
   i. Final cleaning
   j. Demobilization
   k. Overhead and General Conditions
   l. Contractor's fee

11. Plumbing, HVAC, Electrical, and Life Safety work shall be broken down in accordance with the following subcategories, as a minimum:
   a. Fire Protection:
      1) Service to building
      2) Rough-in
      3) Finish-out
   b. Plumbing:
PAYMENT PROCEDURES

1) Service to building including meter
2) Pumps, water heaters, and other equipment
3) Domestic water rough-in
4) Sanitary rough-in
5) Top-out
6) Plumbing fixtures
7) Trim

c. Heating, Ventilating, and Air Conditioning (HVAC):
   1) Units
   2) Controls
   3) Ductwork and rough-in
   4) Grills and diffusers
   5) Testing, adjusting, balancing

d. Electrical:
   1) Service to building
   2) Switchgear
   3) Conduit and boxes
   4) Panels
   5) Wiring
   6) Fixtures
   7) Devices
   8) Trim

e. Fire Detection and Alarm:
   1) Conduit and boxes
   2) Panel
   3) Wiring
   4) Devices

12. 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 following the initial 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 period covered by each Application for Payment shall be one calendar month ending on the last day of the calendar month.
   1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

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

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

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

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

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Preparation and Submittal of Draft of Initial Application for Payment (Pencil Copy):
   1. Prepare draft copy of Application for Payment and meet with Owner and Architect to review the draft copy prior to submittal of the Application for Payment.
   2. Provide four (4) draft (pencil) copies within two (2) business days before the day of the review meeting with Owner, Architect. Submit substantiating data with each application copy: subcontractor applications for payment, copies of invoices, storage receipts, and data required by Owner.
3. After review of draft (pencil) copy by Owner, Architect, and Contractor, prepare Application for Payment, using agreed-upon data on Owner/Architect-reviewed schedule of values and Owner/Architect-reviewed pencil draft.
4. Include specified information required for application preparation.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. Copy of executed Agreement between Owner and Contractor.
   2. List of subcontractors.
   3. Schedule of values.
   4. Contractor's construction schedule (preliminary if not final).
   5. Products list (preliminary if not final).
   6. Schedule of unit prices.
   7. Submittal schedule (preliminary if not final).
   8. List of Contractor's staff assignments.
  12. Initial progress report.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.

J. Payment Applications during Construction: Submit changes in submittals schedule, construction schedule, and other schedules with each application for payment.

K. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

L. Final Payment Application: After completing Project closeout requirements, 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."
   6. AIA Document G707, "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Evidence of compliance and approval by inspector for Texas Department of Insurance - Building Construction requirements. Refer to Section 01 45 00.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00
SECTION 01 31 00

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. Requests for Information (RFIs).
   4. Project Web site.
   5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
   1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Coordination Drawings: Refer to Section 01 31 06 "Coordination Drawings".
C. Coordination Drawings:
   1. Contractor's stamped, approved Coordination Drawings.
   2. Transmittal, submitting Contractor’s approved Coordination Drawings to the Architect for Information.
      a. Retain on site, transmittals and one copy of Contractor’s Coordination Drawings.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with 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 performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. 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. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Meetings: Conduct separate coordination meetings with subcontractors. Owner and Architect may or may not be present at such meetings.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and time a minimum of three days prior to the meeting date.

B. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      e. Indicate required installation sequences.
      f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

C. Coordination Drawing Organization: Organize coordination drawings as follows:
   1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
   b. Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-alarm, A/V, and electrical Work. Show locations of visible ceiling-mounted devices relative to sprinkler heads in acoustical ceiling grid.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
   2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
   3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
      a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
b. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Contractor shall submit RFIs to Architect.
   2. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
   3. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
   4. Include only one subject per RFI. RFIs that include more than one subject or item will be returned to the Contractor unaddressed and require resubmittal as specified.
   5. The Owner reserves the right to assess the Contractor for the cost (based on time and materials) of the review process performed by the Architect or the Architect's or Owner's consultants when RFIs fail to conform to the requirements stated herein, or in the opinion of the Architect are unnecessary or frivolous (i.e., the subject of the inquiry noted in the RFI is suitably addressed in the Contract Documents).

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of Architect.
   6. RFI number, numbered sequentially.
   7. RFI subject or item.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail references, as appropriate.
   10. Field dimensions and conditions, as appropriate.
   11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   12. Contractor's signature.
   13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
   1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. RFI Submittal:
   1. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.

2. Submit electronic submittals via email as PDF electronic files.

3. Faxed RFIs will not be addressed.

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

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

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

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
   1) When Contractor's Notification is returned in more than 10 days, the change resulting from the RFI response is not eligible for an increase in the Contract Time or the Contract Sum.

4. Where the due date for an action or response occurs on a Saturday, Sunday, or legal holiday, such action or response shall be considered due on the next day that is not a Saturday, Sunday, or legal holiday.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT WEB SITE

A. Provide administrator, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:
   1. Project directory.
   2. Project correspondence.
   3. Meeting minutes.
   5. RFI forms and logs.
   6. Task and issue management.
   7. Photo documentation.
   8. Schedule and calendar management.
  10. Payment application forms.
  11. Drawing and specification document hosting, viewing, and updating.
  13. Reminder and tracking functions.

B. Provide up to seven Project Web site user licenses for use of the Owner, Owner’s Construction Manager, Architect, and Architect's consultants.

C. On completion of Project, provide one complete archive copy(ies) of Project Web site files to Owner and to Architect in a digital storage format acceptable to Architect.

D. Provide one of the following Project Web site software packages under their current published licensing agreements:
   1. Newforma, ConstructEx.
   2. Autodesk, Buzzsaw.
   3. Autodesk, Constructware.

E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of AIA Document C106 Agreement acceptable to Owner and Architect.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and time a minimum of 3 days prior to the meeting date.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to
everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
   1. Conduct the conference to review responsibilities and personnel assignments.
   2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Phasing.
      c. Critical work sequencing and long-lead items.
      d. Designation of key personnel and their duties.
      e. Lines of communications.
      f. Procedures for processing field decisions and Change Orders.
      g. Procedures for RFIs.
      h. Procedures for testing and inspecting.
      i. Procedures for processing Applications for Payment.
      j. Distribution of the Contract Documents.
      k. Submittal procedures.
      l. Preparation of record documents.
      m. Use of the premises.
      n. Work restrictions.
      o. Working hours.
      p. Owner’s occupancy requirements.
      q. Responsibility for temporary facilities and controls.
      r. Procedures for moisture and mold control.
      s. Procedures for disruptions and shutdowns.
      t. Construction waste management and recycling
      u. Parking availability.
      v. Office, work, and storage areas.
      w. Equipment deliveries and priorities.
      x. First aid.
      y. Security.
      z. Progress cleaning.
      aa. Inspection required at Substantial Completion for Texas Department of Licensing and Regulations requirements for Texas Accessibility Standards compliance. Refer to Section 01 77 00 “Closeout Procedures.”
      bb. Inspections required by Texas Department of Insurance to ensure compliance with windstorm construction requirements. Refer to Section 01 45 00 “Windstorm Construction Requirements.”
   4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Pre-installation Conferences: 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
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer’s written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.

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

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

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

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.

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

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
   a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.

c. Submittal of written warranties.

d. Requirements for completing design documentation.

e. Requirements for preparing operations and maintenance data.

f. Requirements for delivery of material samples, attic stock, and spare parts.

g. Requirements for demonstration and training.

h. Preparation of Contractor's punch list.

i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

j. Submittal procedures.

k. Coordination of separate contracts.

l. Owner's partial occupancy requirements.

m. Installation of Owner's furniture, fixtures, and equipment.

n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.

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

2. Attendees: In addition to representatives of Owner, Construction Manager, 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Status of design documentation.
6) Deliveries.
7) Off-site fabrication.
8) Access.
9) Site utilization.
10) Temporary facilities and controls.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00
SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.
B. Related Requirements:
1. Section 01 29 00 “Payment Procedures” for submitting the Schedule of Values.
2. Section 01 31 00 “Project Management and Coordination” for submitting and distributing meeting and conference minutes.
3. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
4. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS
A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.
B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships.
Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Major Area: A story of construction, a separate building, a separate wing, a major department, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 INFORMATIONAL SUBMITTALS

A. Submittals Format: Reference Section 01 33 00 “Submittal Procedures” for requirements.

B. Submittals Schedule: Arrange the following information in a tabular format:
   1. Scheduled date for first submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for Architect’s final release or approval.

C. Startup construction schedule.
   1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

D. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

E. Contractor’s Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
   1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

F. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor’s total earnings from commencement of the Work until most recent Application for Payment.

G. Construction Schedule Updating Reports: Submit with Applications for Payment.

H. Daily Construction Reports: Submit at weekly intervals.
I. Material Location Reports: Submit at monthly intervals.
J. Site Condition Reports: Submit at time of discovery of differing conditions.
K. Special Reports: Submit at time of unusual event.
L. Qualification Data: For scheduling consultant, include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
   1. Review software limitations and content and format for reports.
   2. Verify availability of qualified personnel needed to develop and update schedule.
   3. Discuss constraints, including work stages, area separations, interim milestones, and partial Owner occupancy.
   4. Review delivery dates for Owner-furnished products.
   5. Review schedule for work of Owner's separate contracts.
   6. Review submittal requirements and procedures.
   7. Review time required for review of submittals and resubmittals.
   8. Review requirements for tests and inspections by independent testing and inspecting agencies.
   9. Review time required for Project closeout and Owner startup procedures.
  10. Review and finalize list of construction activities to be included in schedule.
  11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

4. Submittals Schedule shall be submitted as one of the conditions precedent to the Architect releasing electronic drawing or model files for Contractor's use. Refer to Division 01 Section “Submittal Procedures” and Appendix 'A' – Electronic File Transfer Agreement Form, attached thereto.

5. Submittal review and processing times listed in Division 01 Section “Submittal Procedures” shall be considered baselines, and shall take precedence over any lesser times promulgated by Contract or in the Submittal Schedule or Construction Schedule.

6. No delay claim will be entertained, and no extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit proper and reasonable processing.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

   a. Imaging Equipment.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.

4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Partial occupancy before Substantial Completion.
   e. Use of premises restrictions.
   g. Seasonal variations.
   h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
   e. Fabrication.
   f. Sample testing.
   g. Deliveries.
   h. Installation.
   i. Tests and inspections.
   j. Adjusting.
   k. Curing.
   l. Building flush-out.
   m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural completion.
   b. Temporary enclosure and space conditioning.
   c. Permanent space enclosure.
   d. Completion of mechanical installation.
   e. Completion of electrical installation.
f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion:
   1. Temporary enclosure and space conditioning.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.3 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR’S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor’s construction schedule using a time-scaled CPM network analysis diagram for the Work.
   1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for commencement of the Work.
      a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect’s approval of the schedule.
2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.
   d. Delivery.
   e. Fabrication.
   f. Utility interruptions.
   g. Installation.
   h. Work by Owner that may affect or be affected by Contractor's activities.
   i. Testing.
   j. Punch list and final completion.
   k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

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

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.

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

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Accidents.
   8. Meetings and significant decisions.
   9. Unusual events (see special reports).
   10. Stoppages, delays, shortages, and losses.
   11. Meter readings and similar recordings.
   13. Orders and requests of authorities having jurisdiction.
   14. Change Orders received and implemented.
   15. Construction Change Directives received and implemented.
   16. Services connected and disconnected.
   17. Equipment or system tests and startups.
   18. Partial completions and occupancies.
   19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
   1. Material stored prior to previous report and remaining in storage.
   2. Material stored prior to previous report and since removed from storage and installed.
   3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information in accordance with RFI provisions of Section 01 31 00 "Project Management and Coordination. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
2.6 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00
SECTION 01 33 00

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the Submittal Schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
   1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
   2. Section 01 31 00 "Project Management and Coordination"; for submitting RFIs, issuing meeting minutes, and submitting Coordination Drawings requirements.
   3. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.
   4. Section 01 45 00 "Windstorm Construction Requirements" for submitting all components and cladding listed in Texas Windstorm Product Index or Florida Building Code with appropriate product evaluation number indicated.
   5. Section 01 77 00 "Closeout Procedures" for submitting warranties.
   6. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   7. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   8. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
   9. Divisions 02 through 33 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 PROVISION AND USE OF ELECTRONIC FILES

A. General: Electronic Drawing files of the Contract Drawings will NOT be furnished by Architect for Contractor's use in preparing submittals unless procedures stated within the attached Appendix ‘A’ are agreed to by all parties and all parties sign the Agreement Form, and the Contractor properly prepares and submits the Submittals Schedule as indicated in Division 01 Section “Construction Progress Documentation.”

B. Release of electronic drawing files are conditional upon the following:
1. The drawings represented in the Electronic Drawing files are not Contract Documents.
2. Files generally available for transfer will be limited to an impediments file as described in the Agreement.
3. Only one set of electronic drawing files will be furnished; Contractor assumes responsibility for distributing pertinent files to the various subcontractors.
4. The electronic drawing files have been developed without the assistance or specific expertise of the individual subcontractors and installers, and therefore do not account for or incorporate means, methods, shop standards, and routing economies required by individual subcontractors for the scope of work required by the finished Work.
5. Modifications to the information and routings of the selected components shown on the electronic drawing files may be required and are the responsibility of the Contractor. All modifications are part of the scope of Work of this Project and shall be provided at no additional cost to Owner.
6. Contractor and subcontractors agree that electronic drawing files are not fit for any particular purpose, including, but not limited to quantity take-offs, pricing, development of a building information model (BIM), clash detection, construction sequencing, or the manufacture of any building component or system.
7. There are no assurances that the electronic drawing files will be usable by the Contractor’s and subcontractors’ systems, infrastructure, or software; and that the files may be subject to anomalies, errors, viruses, malware, or other unintended defects.

C. Limitations of Electronic Drawing File Transfer Agreement:
1. Agreement Form applies to Architectural Drawings only. If Contractor desires electronic drawing files for Drawings prepared by one of Architect’s consultants, Contractor may contact consultant directly to obtain such files.
2. Contractor shall recognize that various consultants retained by the Architect for this Project, or retained separately by the Owner, may have agreements that differ from that included in Appendix A, and may have differing costs and procedures involved with obtaining electronic drawing files.
3. Architect makes no assertion that the Architect’s or Owner’s consultants will furnish electronic files of their Drawings. Additionally, not all Drawings may be available electronically.
1.5 ACTION SUBMITTALS

A. Submittal Schedule: Submit a Schedule of Submittals, arranged in chronological order by dates required by Construction Schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor’s Construction Schedule.
2. Initial Submittal Schedule: Submit concurrently with startup Construction Schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor’s Construction Schedule.
   a. Submit revised Submittal Schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect’s final release or approval.
   g. Scheduled date of fabrication.
   h. Scheduled dates for purchasing.
   i. Scheduled dates for installation.
   j. Activity or event number.
5. Schedule Adjustments: Make adjustments requested by the Architect.

1.6 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved Submittal Schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
   a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for windstorm construction review and resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be
authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. **Initial Review**: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. **Intermediate Review**: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. **Resubmittal Review**: Allow 14 days for review of each resubmittal.

4. **Sequential Review**: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 14 days for initial review of each submittal.

5. Unless otherwise indicated, where the due date of an action or submittal occurs on a Saturday, Sunday, or legal holiday, such action or submittal shall be considered due on the next day that is not a Saturday, Sunday, or legal holiday.

6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

7. In the event Contractor requests an accelerated submittal review by Architect, Architect will endeavor to accommodate Contractor's request. However, any such desired accelerated review times shall not supersede the requirements of the Contract, and no extension of Contract Time will be authorized because of Architect's failure or inability to adhere to Contractor's desired accelerated review times.

**C. 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. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

3. Include the following information for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Submittal number or other unique identifier, including revision identifier.
      1) Submittal number shall use Specification Section number preceded by the unique identifier and followed by a decimal point and then a sequential number (e.g., XXXX-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., <XXXX>-061000.01.A).
   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Other necessary identification.
4. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   a. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

5. Transmittal Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
   a. Transmittal Form Submittals: Provide locations on form for the following information:
      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Construction Manager.
      7) Name of Contractor.
      8) Name of firm or entity that prepared submittal.
      9) Names of subcontractor, manufacturer, and supplier.
     10) Category and type of submittal.
     11) Submittal purpose and description.
     12) Specification Section number and title.
     13) Specification paragraph number or drawing designation and generic name for each of multiple items.
     14) Drawing number and detail references, as appropriate.
     15) Indication of full or partial submittal.
     16) Transmittal number, numbered consecutively.
     17) Submittal and transmittal distribution record.
     18) Remarks.
     19) Signature of transmitter.

D. Options: Identify options requiring selection by Architect.

E. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
   1. Clearly identify deviations from the Contract Documents by clouding or other suitable means acceptable to Architect. Provide accompanying detailed written explanation for each deviation.

F. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
   4. Transmittal shall contain the same information as the first transmittal except that transmittal numbers shall run consecutively and the submission number shall indicate 2nd, 3rd, etc. submission. The drawing number/description shall
be identical to the initial submission and the date shall be the revised date for that submission.

5. No new material shall be included on the same transmittal for a resubmission.

6. On resubmissions of Shop Drawings, the Architect's review shall be generally restricted to review of revisions to the original shop drawing.

7. Clearly identify changes made by clouding or other suitable means acceptable to Architect. Only changes that are clouded will be reviewed on a resubmittal. Architect is not responsible for reviewing resubmittals that are not clouded on resubmittal.

G. 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.

H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with "A - NO EXCEPTIONS" or "B - EXCEPTIONS AS NOTED" action taken from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submittal Format:
   a. Post electronic submittals as PDF electronic files directly to Newforma/ConstrucEx Project Center or equal specifically established for Project.
   b. Number of Paper Copies (If Required):
      1) Submit four copies of each submittal, unless otherwise indicated. Architect will retain one copy and return three copies. Mark up and retain one returned copy as a Project Record Document. Copies shall be distributed as follows:
         a) One copy for Contractor’s use.
         b) One copy for subcontractor’s use.
         c) One copy shall be provided to the Owner. Furnish Owner with final copy designated as “Approved” or “Approved as Noted” only.
         d) Contractor shall be responsible for providing additional copies as required for additional personnel, field use, etc.
      2) Submit one extra set of submittals to be retained by Architect’s consultant, where the consultant was delegated design responsibility for that item of work to which submittal pertains.
      3) Submit one extra set of applicable Division 23 related submittals for Commissioning of HVAC system.
      4) Surplus copies in addition to those indicated above will not be marked up by the Architect or consultant.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and
certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

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

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, unless submittal based on Architect's digital data drawing files is otherwise permitted.
   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. Differentiate between manufacturer-installed and field-installed wiring.
      f. Templates and patterns.
      g. Schedules.
      h. Compliance with specified standards.
      i. Notation of coordination requirements.
      j. Notation of dimensions established by field measurement.
      k. Relationship and attachment to adjoining construction clearly indicated.
      l. Seal and signature of professional engineer if specified.
2. Submittals containing reproduction of Contract Drawings are not considered Shop Drawings and will be returned without action. Any delay due to such rejection will not be grounds for an extension of Contract Time.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      a. Generic description of Sample.
      b. Product name and name of manufacturer.
      c. Sample source.
      d. Number and title of applicable Specification Section.
      e. Specification paragraph number and generic name of each item.
   3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
   4. 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.
   5. 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. Submit color charts showing actual colors. Photographic representations or reproductions will not be accepted.
   6. 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.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
   1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
   2. Manufacturer and product name, and model number if applicable.
   3. Number and name of room or space.
   4. Location within room or space.

F. Subcontractors List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products
or equipment fabricated to a special design. Include the following information in tabular form:

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

G. Submittal Schedule: Comply with requirements specified in this Section for submittal of submittal schedule.

H. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

I. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."

J. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."

K. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

L. Windstorm Construction Requirements as found in Product Index of Texas Department of Insurance or Notice of Acceptance from Florida Building Code. Comply with requirements specified in Section 01 45 00 "Windstorm Construction Requirements."

M. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

O. Insurance Certificates and Bonds: Prepare and submit according to instructions in the General Conditions and the Supplementary Conditions.

P. Construction Photographs: Comply with requirements in Division 01 Section "Construction Progress Documentation."

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

R. Certificates:
   2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
   3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

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

S. Test reports:
   1. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
   2. Product Test Reports: Submit written reports indicating that 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.
   3. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
      a. Name of evaluation organization.
      b. Date of evaluation.
      c. Time period when report is in effect.
      d. Product and manufacturers' names.
      e. Description of product.
      f. Test procedures and results.
      g. Limitations of use.
   4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
   5. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
   6. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

T. 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.

U. 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, or installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

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

W. Material Safety Data Sheets (MSDSs): Unless submittal of Material Safety Data Sheets is specifically required in Division 02 to 51 Sections to confirm compliance with VOC content of materials, Material Safety Data Sheets are not required submittals and are not subject to Architect’s review. Contractor remains solely responsible for job site safety controls, procedures, and programs. Submit Material Safety Data Sheets directly to Owner as part of Closeout Submittals unless otherwise directed. If submitted to Architect, the Architect will not review this information and will return it with no action taken.

2.2 DELEGATED-DESIGN SERVICES

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

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

C. BIM File Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.
1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.
PART 3 - EXECUTION

3.1 CONTRACTOR’S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
   1. Verify with the Specification Section that submittal is required by the Contract Documents. Submittals not required shall not be submitted and, if submitted, will not be processed or reviewed by the Architect.
   2. Verify:
      a. Field measurements.
      b. Field construction criteria.
      c. Catalog numbers and similar data.
      d. Proper interface with adjacent or related work.
   3. Coordinate each submittal with requirements of the Work and of the Contract Documents.
   4. Assign submittal numbers and transmit submittals to the Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 “Closeout Procedures.”

C. 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.
   1. Contractor’s submittal review stamp shall be consistent with the requirements of the Agreement and General Conditions.
   2. A stamp containing language which defers or assigns Contractor’s responsibilities to subcontractor will not be permitted; submittals bearing a stamp with such language will be returned without action. Any delay due to such rejection will not be grounds for an extension of Contract Time.
   3. Submittals without the Contractor’s review stamp and submittals from entities other than the Contractor will be rejected. Any delay due to such rejection will not be grounds for an extension of Contract Time.

3.2 ARCHITECT’S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
   1. Final Unrestricted Release: When the Architect marks a submittal:
      a. A - NO EXCEPTIONS
      b. The Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
   2. Final-But-Restricted Release: When the Architect marks a submittal:
      a. B - EXCEPTIONS AS NOTED
      b. The Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the
Contract Documents. Final payment depends on that compliance. Resubmittal is not required for this action.

3. Returned for Resubmittal: When the Architect marks a submittal:
   a. C – REVISE AND RESUBMIT
   b. Do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
   c. Do not use, or allow others to use, submittals marked "C- REVISE AND RESUBMIT" at the Project Site or elsewhere where Work is in progress.

4. Returned as Rejected: When the Architect marks a submittal:
   a. D – REJECTED
   b. Do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The submittal does not conform to the design concept or meet requirements of the Contract Documents.
   c. Do not use, or allow others to use, submittals marked "D – REJECTED" at the Project Site or elsewhere where Work is in progress.

5. Returned as received for Information Only: When the Architect marks a submittal:
   a. E – FOR INFORMATION ONLY
   b. Proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The submittal is acceptable, but the Architect’s affirmative action is not required.

6. Returned as Not Reviewed: When the Architect marks a submittal:
   a. F - NOT REVIEWED
   b. Submittal is not required by the Contract Documents.

B. Submittals are reviewed for conformance with the design concept expressed in the Contract Documents. Review is not for the purpose of confirming or approving: (a) deviation from the Contract Documents, including but not limited to deviation with reference to material, quantity, location, quality, dimension, or orientation (except as expressly annotated in writing by the Architect herein), (b) means, methods, sequences, or techniques of construction (unless expressly called for in the Contract Documents and herein expressly highlighted for review and approval by the Architect), (c) safety of the contractor(s) work, work plan, procedures, workers or of the site, (d) any clarification of a patent or latent ambiguity or defect in the Contract Documents, or (e) the procurement or request for any labor, materials or other expense of the contractor(s) which is in addition to that previously approved by the Owner. The Contractor shall be and shall remain responsible for: (a) compliance with the Contract Documents, (b) coordination of the Work (including amongst various trades), (c) performing the Work in a safe and satisfactory manner, (d) confirming and correlating quantity and dimensions, and (e) the construction schedule.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party. The action stamp on informational Submittals shall be "E – FOR INFORMATION ONLY" if the submittal is acceptable, and "C – RESUBMIT" if submittal is not acceptable.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

F. Submittals not required by the Contract Documents will be returned marked "F - NOT REVIEWED."

G. Material Safety Data Sheets (MSDSs): Unless submittal of Material Safety Data Sheets is specifically required in Division 02 to 51 Sections to confirm compliance with VOC content of materials, Material Safety Data Sheets are not required submittals and are not subject to Architect’s review. Submit MSDSs directly to the Contractor; do not submit to Architect.

1. Architect will not review MSDSs and will return them with no action taken.

3.3 ATTACHMENTS

A. Appendix A – Electronic Drawing File Transfer Agreement Form.
B. Appendix B – Submittal Transmittal Form.

END OF SECTION 01 33 00
SECTION 01 35 13

HOSPITAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Building Rehabilitation Program and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. This Section includes environmental control specific to occupied medical care facilities.

1.3 PUBLISHED REGULATIONS
   A. Abide by published hospital regulations and amendments, including those that may be issued during the Contract. Particular attention is called to regulations pertaining to circulation, noise, sanitation, safety, security, and behavior.

1.4 OWNER’S REPRESENTATIVE
   A. Abide by directions of Owner’s Representative in matters affecting operation, safety, and security of Hospital, patients, and visitors.
   B. Abide by directions of Hospital Fire Marshal in matters pertaining to fire safety and preventative measures.
      1. Immediately implement oral instructions by local Fire Marshal. Confirmation or explanation of oral instructions will be made by Owner by written notice or at next scheduled progress meeting.
   C. Instruct personnel employed by Contractor, including sub-contractors and their employees, to abide by published regulations, and directives of Owner’s Representative and Fire Marshal.

1.5 ENVIRONMENTAL CONTROLS
   A. Noise Control: Execute Work as quietly as practicable to avoid unnecessary disturbance of patients.
      1. Complaints duly registered by Owner of unacceptable noise levels is cause for implementation of special precautions and methods of operation, as directed by Owner, to reduce noises to acceptable levels.
      2. Owner is sole judge of noise level tolerability.
      3. Submit "Noise Schedule" as soon as practicable indicating type of demolition and other noise inducing construction operations showing dates, times, and duration of such work.
B. **Temporary Partitions:** Provide 1 hour fire rated temporary partitions and door openings.

1.6 **PERSONNEL IDENTIFICATION**
   
   A. Employees of Contractor and sub-contractors are required to wear Owner approved numbered identification badges while on Hospital premises.
      
      1. Conspicuously fix identification badges to outer garments above elbow level.
      
      2. Contractor or subcontractor personnel not complying with this requirement will be denied access to Hospital or will be escorted off premises by Hospital Security Guards.

1.7 **CONSTRUCTION PERSONNEL PARKING**
   
   A. Parking is allowed only in areas designated by Owner. Receive permit or instructions prior to parking on site.

1.8 **NORMAL LIMIT OF OPERATIONS**
   
   A. Normal limit of operations are confined within Limits of Work Area as designated on Drawings.
      
      1. Owner will prohibit Hospital employees, patients, and visitors from using these areas.
   
   B. Allow access to Owner, Architect, and other personnel performing work within limits of operation.

1.9 **PERIODIC OPERATIONS OUTSIDE LIMITS OF OPERATION**
   
   A. Use of certain loading berths, passageways, elevators, and other areas, outside of defined limits of operation will be granted on intermittent basis as required and requested in advance. Owner will judge, and approve in advance, proper time, and extent of such use.
   
   B. Limit requests for use of berths, corridors, elevators, and other spaces to hour-by-hour basis and approved in advance by Owner.
   
   C. Comply with designated travel paths, staging areas, dumpster locations, and other restricted items indicated on Drawings.

1.10 **SCHEDULING**
   
   A. Schedule arrangements for work which will involve interference with normal Hospital functioning, particularly in occupied patient areas, or adjacent areas, five working days in advance with Owner to provide for minimum of disruption and inconvenience.
      
      1. Owner will schedule and approve interferences to minimize disruption to normal Hospital functioning.
1.11 WORKING HOURS AND OVERTIME NOTIFICATION
   A. Notify Owner and receive permission for work outside of normal daytime working hours either within or outside limits of operation.
   B. If in Owner’s judgment, any item of work is being unreasonably delayed and interfering with progress of other dependent work through no fault of Owner, overtime work may be ordered at Contractor’s expense.
   C. Owner may direct Contractor to perform overtime work not originally required by Contract. When overtime work is requested for convenience, additional payment to Contractor will be made for premium time only.

1.12 TORCH-CUTTING AND WELDING PERMITS
   A. Welding: Neither welding nor arc-welding will be permitted without appropriate permit from Hospital Engineering Department.
      1. Hospital has right to stop work at any time if it is determined that unsafe conditions exist.
      2. Correct unsafe conditions as directed by local Fire Marshal and obtain approval of such corrections prior to commencing further work.
      3. Provide electrical power directly from panel box for use by arc-welding equipment. Ascertain that electrical panel has capacity to support welding operations without negative impact on Hospital electrical loads. Do not use Hospital outlets for power sources.
      4. Use of single-phase transformer welding equipment is not permitted.
      5. No welding will be permitted when critical procedures are taking place in adjacent areas; coordinate with Owner.
   B. Fire Protection: Keep required exit corridors and passageways clear and unobstructed.
      1. Remove flammable materials to location not closer than 35 feet from welding operations.
      2. Instruct workmen to location of nearest fire alarm.
      3. Completely cover fixed flammable items with fire-resistant blankets.
      4. Existing smoke detectors and fire sprinkler systems shall remain operational throughout Project. If possible false alarms are anticipated during specific construction operations, detectors may be covered during that specific operation with proper notifications and concurrence of local jurisdiction, but must be cleared and operable at end of each working day.

1.13 BUILDING PERMIT
   A. Obtain building permit and be responsible for securing any necessary inspection fees. Include cost in Contract Sum.
   B. Conspicuously display permit at Project site.
PART 2 - PRODUCTS

2.1 EXISTING UNATTACHED EQUIPMENT

A. Existing unattached equipment scheduled for salvage or reuse will be removed from work area by Owner prior to start of construction.

PART 3 - EXECUTION

3.1 EXISTING ATTACHED EQUIPMENT

A. Disconnect and remove existing attached equipment which has been tagged and marked for salvage and reuse by Owner. Remove such equipment in largest possible sections convenient for handling.

B. Disconnect and cap services and utilities serving removed equipment and perform necessary patching.

C. Deliver Owner tagged and marked equipment to designated storage areas within Owner’s property.

D. In addition to existing attached equipment which has been tagged and marked for salvage and reuse, disconnect and remove following items affected by new construction and store at Owner designated locations.
   1. Hi-temperature alarm thermostats.
   2. Recorder and door hardware from controlled temperature rooms.
   3. Television set support brackets.
   4. Gooseneck faucets and foot control valves from sinks.
   5. Fire and smoke dampers.
   7. Generators (complete).
   8. Vacuum, air, and oxygen outlets.
   9. Terminal reheat units.
   10. Adjustable over-bed light fixtures.
   11. Diffusers and registers.
   12. Pneumatic thermostats.
   13. Fire alarm systems.
   15. Door and cabinet hardware.
   16. Solid core wood doors (3 feet and wider, including lead lined units).
   17. Mirror and shelf units, toilet accessories.
   18. Nurse call and intercom systems.

E. Remove all other equipment not tagged or specified and remove from site. Sale of Contractor salvaged items will not be permitted on-site. Comply with applicable regulations for disposal of hazardous materials.
3.2 CLEAN-UP

A. Refer to Section 01 73 00 for additional requirements.
   1. Keep premises free from accumulation of waste materials or rubbish.
      Remove trash daily.
   2. Leave existing toilet rooms in clean and sanitary conditions daily.

END OF SECTION

Attachment:
Implementation of Interim Life Safety.

Appendix:
   Building Rehabilitation Program
IMPLEMENTATION OF INTERIM LIFE SAFETY PROGRAM
FOR HOSPITAL PROJECTS

Definition: Interim Life Safety Measures (ILSM) - A series of eleven administrative actions required to temporarily compensate for the hazards posed by existing NFPA 101 2012 Life Safety Code deficiencies or construction activities.

Policies:

1. Implementation of ILSM shall be required in or adjacent to all construction areas and throughout buildings with existing LSC deficiencies.

2. ILSM shall apply to all personnel (including construction workers) and shall be implemented upon project development and be continuously enforced through project completion.

3. The ILSM shall consist of the following actions:
   a. Ensuring free and unobstructed exits. Personnel receive additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction areas are inspected daily.
   b. Ensuring fire alarm and unobstructed access to emergency services and for fire, police, and other emergency forces.
   c. Ensuring fire alarm, detection, and suppression systems are in good working order. A temporary but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly.
   d. Ensuring temporary construction partitions are smoke tight and built of non-combustible or limited combustible materials that will not contribute to the development or spread of fire.
   e. Providing additional fire-fighting equipment and training personnel in its use.
   f. Prohibiting smoking throughout the facility's buildings, and in and adjacent to construction areas.
   g. Developing and enforcing storage, housekeeping, and debris removal practices that reduce the building’s flammable and combustible fire load to the lowest feasible level.
   h. Conducting a minimum of two fire drills per shift per quarter.
   i. Increasing hazard surveillance of buildings, grounds and equipment, with special attention to excavations, construction areas, construction storage, and field offices.
   j. Training personnel to compensate for impaired structural or compartmentalization features of fire safety.
   k. Conducting organization-wide safety education programs to promote awareness of LSC deficiencies, construction hazards and ILSM.
4. Owner’s Facility Engineering department will be responsible for filling out attachments in coordination with contractor who will be doing the construction.

5. Owner’s Facility Engineering department will report to the Owner’s Safety Coordinator the nature and extent of upcoming construction activities or situations in which there are existing NFPA 101 2012 LSC deficiencies (See Attachment A).

6. The Safety Coordinator will then determine which of the eleven ILSM are appropriate to be put in place during the project or term of deficiency.

7. If time does not permit the Safety Coordinator to approve the ILSM to be initiated prior to start of project, Plant Operations will initiate the appropriate ILSM immediately. The report shall be submitted for approval at the next scheduled Environment of Care Committee meeting.

8. Means of exiting construction areas shall be inspected daily and documented. (See Attachment B).

9. Hazard Surveillance of buildings, grounds and equipment with special attention to excavations, construction areas, construction storage and field offices shall be conducted no less frequently than weekly and documented (See Attachment C).

10. Once a construction project is complete or a LSC deficiency has been resolved, Plant Operations will report to the Safety Coordinator and they in turn, will approve the discontinuation of ILSM.
ATTACHMENT A

Report of construction activities and/or situations in which there are Existing NFPA 101 2012 Life Safety Code deficiencies to Owner.

Date: ____________________________________________
Facility: __________________________________________

Describe nature and extent of construction activities and/or situations in which there are existing NFPA 101 2000 LSC deficiencies (include length of time estimated for project):

________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________

Considerations:

1. Will exits in project area be obstructed? (  )Yes (  )No
   If yes, what plans are in place to provide alternate egress?
   __________________________________________________________________________________________
   __________________________________________________________________________________________
   __________________________________________________________________________________________
   __________________________________________________________________________________________

2. If alternate exits must be designated or if other fire safety features are impaired, who will be responsible to train personnel?
   __________________________________________________________________________________________
   __________________________________________________________________________________________
   __________________________________________________________________________________________
   __________________________________________________________________________________________

3. Will access to the emergency services of the facility be obstructed? (  )Yes (  )No
   If yes, how will traffic be rerouted?
   __________________________________________________________________________________________
   __________________________________________________________________________________________
   __________________________________________________________________________________________
4. If the fire alarm system is impaired, is there a temporary, but equivalent system provided?  
( ) Yes  ( ) No

5. Will temporary construction partitions need to be erected?  
( ) Yes  ( ) No
If so, who will be responsible to see that they are smoke tight and built of non-combustible or limited combustible materials that will not contribute to the development or spread of fire?

6. Who will be responsible to see that additional fire fighting equipment is available for personnel in construction areas?

7. Do significant code deficiencies exist or does a construction project significantly affect a life safety system?  
( ) Yes  ( ) No
If so, fire drills must be conducted a minimum of two per shift per quarter. Who will be responsible to see that these are performed?

8. Who will be responsible to review ILSM with construction foreman/supervisor?
Decision of Owner's Safety Coordinator:

The following ILSM shall be initiated for the duration of the construction project and/or existence of deficiencies:

A. Appropriate measures

( ) a. Ensuring free and unobstructed exits. Personnel receive additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction areas are inspected daily.

( ) b. Ensuring free and unobstructed access to emergency services and for fire, police and other emergency forces.

( ) c. Ensuring fire alarm, detection and suppression systems are in good working order. A temporary but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly.

( ) d. Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire.

( ) e. Providing additional fire-fighting equipment and training personnel in its use.

( ) f. Prohibiting smoking throughout the organization's buildings and in and adjacent to construction areas.

( ) g. Developing and enforcing storage, housekeeping and debris removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level.

( ) h. Conducting a minimum of two fire drills per shift per quarter.

( ) i. Increasing hazard surveillance of buildings, grounds and equipment with special attention to excavations, construction areas, construction storage and field offices.

( ) j. Training personnel to compensate for impaired structural or compartmentalization features of fire safety.

( ) k. Conducting organization-wide safety education programs to promote awareness of LSC deficiencies, construction hazards and ILSM.

________________________________________  _________________
Signature of Plant Operations Director  Date
Or Safety Coordinator
ATTACHMENT B

Interim Life Safety Checklist
for Means of Egress

* Means of egress in construction area shall be inspected daily.

Facility: __________________________

<table>
<thead>
<tr>
<th>Date</th>
<th>Location of Construction Site</th>
<th>Signature of Employee Performing Inspection</th>
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ATTACHMENT C

INTERIM LIFE SAFETY MEASURES CHECKLIST

1. Do all exits provide free and unobstructed egress?  ___Yes___ ___No
   If not, describe

2. Do buildings or areas under construction maintain escape routes for construction workers?  ___Yes___ ___No

3. Have personnel received training if alternative exits have been designated or if any other fire safety features are impaired?  ___Yes___ ___No

4. Is there free and unobstructed access to the emergency departments/services and for emergency forces?  ___Yes___ ___No

5. If the fire alarm system is impaired, is there a temporary, but equivalent system provided?
   Is there appropriate posting in the department to notify employees that an interim life safety fire plan is in place?  ___Yes___ ___No
   If not, describe:

6. Are additional fire drills being performed (at least 2 per shift/quarter)?  ___Yes___ ___No

7. Are temporary construction partitions smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire?  ___Yes___ ___No
   If not, describe:

8. Is additional fire fighting equipment available for personnel in construction area?  ___Yes___ ___No
   If not, describe:

9. Is there evidence of smoking in or adjacent to all construction areas?  ___Yes___ ___No
   If so, describe:

10. Does the storage, housekeeping and debris removal indicate that the flammable and combustible fire load has been reduced to the lowest level necessary for daily operations?  ___Yes___ ___No
    If not, describe:

Other comments:  

Date:______________  Time: ______________

Person conducting the surveillance:  ________________________________

Facility: ______________ Site observed:  ________________________________

Send to Safety Office. Safety Office will distribute referrals to appropriate department directors and/or the construction foreman if needed.
SUPPLEMENT TO POLICY/PROCEDURE
Implementation of Interim Life Safety Program

1. On-site parking will not be provided for the Contractor or his trades. Two spaces only may possibly be issued to the Contractor for the duration of this project.

2. Work hours will be established at the Pre-construction Conference.

3. Construction crew entrance into the hospital is to be established at the Pre-construction Conference.

4. Lunch and break privileges are not to be taken in the hospital cafeteria.

5. Toilet facilities will be provided by the Owner.

6. Smoking restrictions and use of designated smoking areas will be strictly enforced.

7. Dress codes are to be enforced. (No tank tops, shorts, torn or frayed jeans are permitted.).

8. Radios are not permitted in public areas. Radios in use, if any, will be kept at low volume.

9. Construction signage is to be provided by the Contractor.

10. Construction project meetings are to be held at time and location established at Pre-construction Conference.

11. All work areas are to be provided with negative air pressure and direct exhaust to minimize the filtration of construction dust into adjoining critical care areas.

12. Floor finish in public areas is to be accomplished during off hours coordinated with Owner.

13. All ceiling grid tees are to be replaced at areas where temporary partitions were secured to ceiling and grid was damaged by screw holes.

14. Shut-down of any hospital utility (Elec/HVAC/etc.) is to be coordinated with 72 hrs. advance notice given to the Owner.

15. Zone fire alarm and zone sprinklers may be shut down daily only if coordinated with the Plant Operations supervisor. Contractor must also maintain the required fire extinguishers and locate and advise personnel of alarm pull box locations as required by code.

16. All costs associated with false fire alarms caused by the Contractor or his trades are to be the responsibility of the Contractor.
   a. Trash will be removed from the area of work on a daily basis. Area of work is to be cleaned daily of all debris etc. Contractor is to maintain a clear work place at all times.
   b. Trash dumpsters are to be provided by Contractor for use during construction. Coordinate location with Owner.
   c. Storage of materials will be limited to the area of work and within a storage trailer provided by the Contractor. The location of the trailer shall be coordinated with the Owner.

END OF ILSM
SECTION 01 35 33

HOSPITAL INFECTION CONTROL POLICY

PART 1 – GENERAL

1.0 SUMMARY:

A. Section Includes: Hospital infection control policy and procedures.

B. Related Sections:

1. Section 01 35 35 – Above Ceiling Work Requirements
2. Section 01 50 00 – Temporary Facilities
3. Building Rehabilitation Program (BRP) – See Appendix

1.1 POLICY:

The purpose of this policy is to assure a safe environment for patients, visitors, and hospital staff, and to maintain compliance with (HHSC)DSHS, JCAHO, NFPA, CDC Guidelines, OSHA, APIC Principles & Practices, and Hospital Regulations. This policy is designed to maintain a level of safety that will facilitate a successful construction or renovation project as well as reduce chances of airborne infections to visitors, patients, staff and construction workers. If access into the ceiling in occupied areas is required, procedures as described herein must be followed.

1.2 PRE-EXISTING DAMAGE:

Upon written request by the Contractor, representatives of the Owner will be available, prior to commencement of actual work, to survey the work area for pre-existing damage. Any damage found by this survey will be recorded and will be the Owner’s responsibility.

If no survey is required then, upon commencement of the construction work, finished surfaces in and immediately below the construction areas will be presumed to be in a condition similar to surfaces of similar age and service in the remainder of the Hospital. Damage no readily assignable to other causes will be presumed to be caused by the construction work. The Contractor shall repair all damage caused by the construction work.

1.3 PROTECTION:

If surface below certain space is the top of the lay-in ceiling and if working above people down below becomes unavoidable, provide temporary work surfaces to provide a safe working platform and protect the ceiling and the spaces below from falling objects and materials. Take all necessary precautions to protect the people and spaces below from injury due to the Contractor’s operations.

Exercise caution when handling fluids, particularly the heating water, in the interstitial space. When working with fluids, provide a water-tight barrier beneath the work area to catch and retain all spillage before it reaches the ceiling below.
Should a particular operation be deemed to pose an unacceptable risk to people working below, review and schedule this operation with the Owner’s Representative to minimize the hazard.

1.4 RESPONSIBILITY:

A. The General Contractor of the project shall assign a Project Safety Manager.
B. The Project Safety Manager shall be responsible for developing a project plan at the project start-up and implementing the plan during the duration of the project. A copy of the plan shall be forwarded to the designated Hospital Representative for review and comments.
C. The designated Hospital Representative shall approve the plan in writing prior to commencement of renovation work.
D. The project Superintendent shall be familiar with the plan and oversee the construction phasing and methods necessary, in order to comply with the policy guidelines.
E. The Project Safety Manager shall assign specific personnel responsibilities appropriate to maintain the policy.

1.5 DEFINITIONS:

A. “Minor Renovations with Minimal Sensitivity” are defined for purposes of this policy to be minor revisions to plumbing, ductwork or electrical systems, aesthetic finish upgrades, installation of phone/data cabling in existing raceways, etc. within areas where existing partitions and ceilings are to remain and without compromise to the existing HVAC air distribution system balance.

B. “Major Renovations with Moderate Sensitivity” are defined for purposes of this policy to be where barrier precautions and separations from existing or adjacent occupied areas are required. Adjacent occupied Hospital areas would include, but are not necessarily limited to, Med/Surg Patient Rooms, LDR, Emergency, Radiology, Special Procedures, Recovery, and Administration. This would include renovation projects requiring construction of new partitions, removal of existing partitions, major MEP utility changes, equipment installations and major demolition or removal of existing finishes.

C. “Major Renovations with High Sensitivity” are defined for purposes of this policy to be where barrier precautions and separations from existing or adjacent occupied Hospital areas are required. Adjacent occupied Hospital areas would include, but are not necessarily limited to, Neonatal Nurseries, Immune Depressed Patient areas, OR, ER, ICU, LDRP, Isolation rooms, CT area, and Cath Lab. The Hospital’s Infection Control Nurse or Administrator shall be consulted to identify “high risk” areas. This would include renovation projects requiring construction of new partitions, removal of existing partitions, major MEP utility changes equipment installations and major demolition or removal of existing finishes.

1.6 PLAN MONITORING AND INSPECTION:

A. A pre-construction meeting with the designated Hospital staff and all trade subcontractors associated with work related to this plan shall be coordinated by the Project Safety Manager or his designee.
B. The pre-construction checklist shall be completed, in order to confirm the
procedures and to assure that preparatory provisions are in place prior to start of work.

C. The daily inspection checklist shall be completed by the Project Safety Manager or his designee and a designated Hospital representative, in order to ensure that barriers are properly in place and maintained to prevent transfer of air movement, daily checklists are being completed and deficiencies, if any, are being corrected.

1.7 GENERAL CEILING ACCESS DIRECTIVES:

Comply with the requirements of Section 01 35 35 – Above Ceiling Work Requirements.

PART 2 – PRODUCTS

2.1 INFECTION CONTROL PROCEDURES AND PROTECTIVE ENCLOSURES AND BARRICADES:

A. Contractor shall install dustproof enclosures for work as specified and when required to protect areas occupied by the Owner from dust, debris and damage.

B. Dustproof enclosures are required in accordance with Part 4 of this Section.

2.2 INFECTION CONTROL GENERAL REQUIREMENTS:

A. All construction separation walls shall be dust proof, floor to structure, airtight enclosures.

1. Traffic between barricaded areas and open areas shall be kept to a minimum. Keep door to such areas closed at all times. Transport materials and refuse into area from an external site without violating patient care areas by transporting in covered containers.

2. Provide negative pressure in construction area by blocking supply ventilation or with use of negative air machine, to filter dust on existing returns. Do not re-circulate air from construction area to remainder of hospital.

   a. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.

B. All barricaded construction areas shall be ventilated by use of negative air machines exhausted through filters to the outside of the building. Negative air machines shall be Micro-Trap MT-C Negative Air Filtration Units of Micro-Trap, Inc., or approved equal.

   1. Filters shall be changed daily during demolition and shall filter particles to 0.12 microns. Contractor shall provide a minimum of two negative air machines and shall cease any demolition in areas not serviced by negative air machines. Maintain an airflow of approximately 100 CFM at barricade entrance door openings.

   2. Vent negative air machines to outside by removing existing windows and replacing them with vented sheet metal panels.

   3. Provide constant monitor to ensure negative air pressure is maintained.
C. The Contractor shall provide all barricades, warning signs, and warning lights to protect the public, the existing building, storage areas, and materials or equipment. Barricades shall be approved by Owner.

D. Locate dumpsters and trash chutes away from HVAC air intake louvers.

2.3 ENCLOSURE BARRIERS:

A. Full height, noncombustible construction, with minimum ½” gypsum board and 3-1/2” R11 insulation batts to reduce noise. Use 3-inch wide masking tape to tightly seal top, bottom, and all seams to prevent spread of dust to occupied areas, including above ceilings. Partitions shall extend to bottom of ceiling or to bottom of deck, where there is no ceiling. Provide fireproof polyethylene barriers above ceilings, complying with NFPA 701. Paint occupied side of partition.

1. Barricade Doors: 3'-0” minimum width, with frame and hardware, including closer, tightly weather-stripped to prevent flow of dust. Locate as directed and swing into construction area. Keep barriers locked outside of working hours. Keys for emergency access shall be furnished to the Owner.

2. Obtain Owner’s approval of exact location and details of barrier construction. Materials for barricade must be precut in unoccupied areas. No power driven fasteners allowed. Provide entrance vestibules as detailed. Provide carpets or adhesive mats inside vestibule and inside barricade at door to vestibule.

3. Provide construction signs on all doors in temporary areas that state "Construction Area – Do Not Enter”.

B. Enclosure outside work area (including spaces above furred ceilings): Whenever work is necessary outside of the construction barricades, the space where work is being done, including ladder, shall be contained within a full height polyethylene sheet barrier minimum 4 mil thickness, tightly taped at all edges and along seams. Provide overlapping flap at least 2 feet wide for access. Contractor may use barrier control cube specified herein.

1. All work performed outside the construction barricade, including all work in corridors and lobbies, shall be performed outside of normal working hours and shall be scheduled in advance with Owner, except where specified otherwise.

2. At no time shall any construction equipment or material be stored outside the construction barricade.

3. Any dust tracked outside of construction area shall be cleaned up immediately. Contractor shall have the necessary manpower and equipment (dust and wet mops, brooms, buckets, and clean wiping rags) to keep adjacent occupied areas clean at all times.

2.4 LIGHTING:

Provide sufficient temporary lighting to ensure proper workmanship and safety everywhere.

2.5 ACCESS PROVISIONS:

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Provide ramps, stairs, ladders, and similar temporary access elements as reasonably required to perform the work and facilitate its inspection during installation.

2.6 TEMPORARY PARTITION CUBE FOR WORK IN STERILE CORRIDORS:

A. Environmental Containment Unite (ECU), Mintie Technologies, Inc., 1114 San Fernando Road, Los Angeles, CA 90065. Product is distributed through Grainger, Inc.

B. Kontrol Kube, including Adjustable Aluminum Frame #6440; Vinyl Enclosure #6442; Wheel Base Platform #6443; by Fiberlock Technologies, Inc., P.O. Box 432, Cambridge, MA (617) 876-8020. Provide with inspection window and pressure differential porthole. Include Nilfisk 87 cfm vacuum device and manometer.

1. A portable vinyl tunnel or a polyethylene shroud will be used for a single ceiling access.
2. The portable vinyl tunnel must remain in place until the ceiling is secured (all accesses closed).
3. If the access is larger than the vinyl tunnel, a polyethylene shroud enclosing the ladder shall be used. The shroud’s opening shall have a 3-foot overlap of plastic to decrease risk of airborne dust.
4. Polyethylene shrouds/barriers must be held in place to walls and floors with the use of tape. The seam on the ceiling shall be reinforced with a frame and flat head screws. All polyethylene shall be fire retardant type.
5. If the worker needs to crawl about pipes, ducts, or other building infrastructures to investigate a condition, the worker must put on a mask, disposable white coverall, and disposable shoe covers before going above the ceiling. Afterwards, the worker must strip off the coverall and shoe covers carefully, turning the coverall “inside-out”, and deposit the mask, coverall, and shoe covers into a plastic trash bag inside the tunnel or shroud. This plastic trash bag shall be secured (tied off) and be discarded as directed by Hospital Representative and may not be discarded within any “patient care area”.
6. When the worker leaves the work site, the ceiling access must be dismantled and the ceiling tiles replaced, at the end of each day.
7. In patient care areas, the apparatus (tunnel or shroud) must be dismantled and ceiling tiles replaced at the end of each day.
8. Thorough cleaning of surfaces which become exposed to dust must be accomplished before leaving the job site. The cleaning can be accomplished by the use of either a HEPA filtered vacuum cleaner or damp mop.

PART 3 – EXECUTION

3.1 GENERAL:

A. These guidelines and recommended procedures are minimum requirements.

B. Construction means and methods shall be provided to maintain barrier separation
and manage the airflow movement at construction area and adjacent occupied Hospital areas during renovation and/or additions projects.

C. Precautions and steps to control construction dust, fungi, and other airborne contaminants during all phases of construction shall be established.

D. Proper means shall be provided during renovation projects to maintain the HVAC air distribution system air balance. Sensitive area requiring negative and/or positive relative room pressurization are to be maintained. If the project design of HVAC equipment and controls do not provide proper airflow and changes, temporary equipment and controls may require consideration.

3.2 HOSPITAL CEILING ACCESS PROCEDURES:

A. Contractor shall comply with the Hospital’s access and notification policy, as specified in this section and shall note information on associated fines for lack of compliance.

1. Top surface of ceiling panels adjacent to area of work shall be sprayed with a fine water mist to settle dust prior to and during work.

3.3 WORK IN OCCUPIED AREAS - GENERAL:

A. Where work occurs in occupied areas, the Contractor shall be responsible to provide access openings through existing plaster, gypsum board or acoustical ceilings and restore ceilings to original condition after work is complete and to insure dust control within access areas.

1. Provide temporary plywood panels anchored to existing steel ceiling support grid for support of workers crawling above ceilings. Panel thickness shall suit spans between existing steel supports.
2. All work provided outside the construction barricades shown on drawings, including all work in and above corridors, shall be performed outside of normal working hours.
3. Protect the ceiling and the spaces below from falling objects and materials. Take all necessary precautions to protect the people and spaces below from injury due to the Contractors’ operations.

B. Remodeling work in certain rooms, which serve other rooms, must be coordinated and phased in with the phasing of the remodeled rooms, if required, so that at no time are both rooms simultaneously inoperative. Any downtime necessitated by the remodeling work shall be fully discussed and coordinated with the Owner’s representative in advance of the shutdown.

1. Dust: Generation of airborne dust will not be tolerated. Clean the work area prior to starting work as necessary to minimize existing dust, which may become airborne during construction. Provide drop cloths and dust partitions as necessary to contain dust and debris generated by the Work.
2. Demolition material and dust and dirt shall be removed in tightly sealed, covered, rubber-tired plastic dump carts. Containers shall be fitted with clean polyethylene covers, complete sealed at perimeter by wire tying or taping. Before leaving area, all containers shall be wiped clean to prevent
tracking of dust. Place rugs inside barriered entrances, keep them clean or changed daily.

3. Hot Processes: Hot processes, particularly welding and flame cutting, which generate significant quantities of smoke pose a special concern. These processes have the potential of setting off the building fire alarm system which automatically calls the fire department as well as disrupting the Owner’s operations. Therefore, all work involving hot processes must be scheduled with the Owner's designated representative before any system is deactivated.

3.4 MINOR RENOVATIONS WITH MINIMAL SENSITIVITY:

A. Work in non-sterile areas:

1. Contractor shall notify Owner’s Representative of area to be accessed prior to start of work.
2. Reroute traffic with barriers as required so that no patients or staff travel beneath work area.
3. The designated Hospital’s Representative shall be contacted for all ceiling access problems.
4. Water mist surfaces where work is required to control dust. Water misting above lay-in ceiling tiles shall occur prior to removal of tiles if work or inspections are necessary above ceilings. Clean top of adjacent ceiling panels after work is complete. Acoustical tiles shall be replaced and access panels shall be closed immediately when the worker leaves the work site.
5. Place dust mats at entrances and exists of work area.
6. Should the work have the potential to create dust due to cutting or demolition activities, the room shall be isolated from the adjacent areas with all air vents, windows, and doors sealed to jamb with duct tape or similar means.
7. Holes cut or punctured into doors, walls, floors, ceilings, etc. shall not remain exposed more than four (4) hours unless the area is sealed air tight from adjacent occupied areas.
8. Construction debris and waste shall be covered and contained in waste receptacles and/or carts prior to transport through occupied Hospital areas.
9. Wet mop and/or vacuum with a filtered vacuum cleaner, in order to control dust during operations and when leaving the area.
10. Upon completion of all work, remove seals on all air vents.

B. Additional requirements for work in sterile corridors:

1. Access to sterile corridors must be approved by the Hospital Representative that is responsible for the area. Workers must wear protective sterile disposable coveralls as directed by the Hospital staff.
2. A polyethylene barrier shall be used to seal off area or ceiling access. The barriers opening shall have a 3-foot overlap of plastic to decrease risk of airborne dust.
3. Polyethylene barriers shall be held in place to walls and floor with use of tape. The seam of the ceiling shall be reinforced with a frame and flat head screws. All polyethylene shall be fire retardant type.
4. If a worker needs to crawl about pipes, ducts, or other building infrastructure to investigate a condition, the worker must put on a mask, disposable white coverall and disposable shoe covers before going above the ceiling. Afterwards, the worker must remove the coverall and shoe covers.
closely, turning the coverall “inside-out”, and deposit the mask, coverall, and shoe covers into a plastic trash bag inside the barrier. The plastic trash bag shall be secured (tied off) and discarded as directed by the Hospital Representative and may not be discarded within any “patient care area”.

5. When workers leave the work site, the ceiling access must either be completely closed or protected by an appropriate barrier.

6. In patient care areas, the barrier must be dismantled and ceiling tiles replaced at the end of the day.

7. Thorough cleaning of all surfaces, which become exposed, to dust shall be completed before leaving the job site. Either a HEPA filtered vacuum cleaner or damp mop shall be utilized.

3.5 MAJOR RENOVATIONS WITH MODERATE SENSITIVITY:

A. Construction barriers shall be installed to isolate the area of construction from adjacent areas or occupied areas prior to start of the work. Barriers shall be sealed air tight and constructed of metal stud framing with drywall (one-sided minimum) or fire retardant polyethylene sheeting from floor to ceiling. New or existing compartment rated partitions shall be utilized for the construction separation barriers whenever possible. All joints or seams in the barrier shall be sealed.

B. The HVAC air distribution system shall be designed or modified to eliminate the transfer of airflow from the construction work area to other adjacent areas. Temporary ductwork and/or exhaust systems may be required. All air vents connected to an operating HVAC system shall be blocked off and sealed. The area of construction or demolition shall be maintained under a relative negative air pressure to adjacent areas.

C. Exposed or open ductwork within the construction area shall be capped and sealed, including vents, in order to avoid contamination during construction.

D. Dust mats shall be placed at entrances and exits to the work area.

E. When entering or exiting through an occupied Hospital area, workers shall pass through an anteroom where they must be vacuumed before leaving the work area. Efforts should be made to provide direct exterior egress to the area of demolition, in order to avoid travel through occupied Hospital areas.

F. Workers shall wear respiratory protective masks within the work area. Respiratory protection shall be as required for compliance per OSHA standards 1926.103 for the hazards which may be present.

G. All holes, pipes, conduits, or other openings penetrating the construction barrier to an adjacent area shall be immediately sealed air tight, in order to maintain isolation and to stop movement of airflow and debris. In addition, provide seals at elevator hoist ways and stairwell openings.

H. All precautions and guidelines for “minor renovations” in paragraph 3.04 shall apply to this work.

I. Upon completion of work designated as “major renovations”, the following precautions shall apply prior to the removal of any temporary barriers.

1. The area shall be vacuumed with a filtered vacuum cleaner.
2. The work area shall final cleaned and wet mopped with a disinfectant. 
3. The work area shall be inspected by the designated Hospital’s Representative and confirmed clean and free of contaminants.
4. The area shall be final cleaned and disinfected or sterilized by the Hospital’s Environmental Services staff.
5. Upon satisfactory completion of these precautions, and after final inspections and approvals by all appropriate parties, the temporary barriers may be removed.
6. Barriers removed within occupied hospital areas shall be treated as debris during the removal process. Remove barrier materials with covers and in sealed bags or taped carts.
7. Air sampling shall be provided to include baseline and preoccupancy samples, in order to assure that proper air quality is maintained during the entire project.

3.6 MAJOR RENOVATIONS WITH HIGH SENSITIVITY:

A. Construction barriers shall be installed, in order to isolate the area of construction from adjacent areas or occupied areas prior to start of the work. Barriers shall be sealed air tight and constructed of metal stud framing with drywall (both sides) from floor to structural deck above. New or existing compartment rated partitions shall be utilized for the construction separation barriers whenever possible. All joints or seams in the barrier shall be sealed.

B. The HVAC air distribution system shall be designed or modified to eliminate the transfer of airflow from the construction work area to other adjacent areas. Temporary ductwork and/or exhaust systems may be required. All air vents connected to an operating HVAC system shall be blocked off and sealed. The area of construction or demolition shall be maintained under a relative negative air pressure to adjacent areas.

C. Exposed or open ductwork within the construction area shall be capped and sealed, including vents, in order to avoid contamination during construction.

D. Dust mats shall be placed at entrances and exits to the work area.

E. When entering or exiting through an occupied area, workers shall pass through an ante-room where they must either be HEPA vacuumed before leaving the work area or wear a sterile cloth or paper coverall cap and shoe covers each time they leave the work area. Efforts should be made to provide direct exterior egress to area of demolition, in order to avoid travel through occupied hospital areas.

F. A HEPA filtering system shall be placed at each construction exit to Hospital occupied areas. Filters shall be replaced and maintained as necessary. Relative air pressure sensors shall be installed with alarms at all construction exits to occupied Hospital areas.

G. Workers shall wear respiratory protective masks within the work area. Respirator protection shall be as required for compliance per OSHA standard 1926.103 for the hazards, which may be present. Workers who must travel to, or through, other areas of the Hospital shall wear shoe covers. Shoe covers shall be changed each time the worker leaves the work area.

H. All holes, pipes, conduits, or other openings penetrating the construction barrier to
an adjacent area shall be immediately sealed air tight, in order to maintain isolation and to stop movement of airflow and debris. In addition, provide seals at elevator hoist ways and stairwell openings.

I. All precautions and guidelines for “major renovations” in paragraph 3.05 shall apply to this work.

J. Upon completion of work designated as “major renovations”, the following precautions shall apply prior to the removal of any temporary barriers.
   1. The area shall be vacuumed with a HEPA filter vacuum.
   2. The work area shall be final cleaned and wet mopped with a disinfectant.
   3. The work area shall be inspected by the designated Hospital’s Representative and confirmed clean and free of contaminants.
   4. The area shall be final cleaned and disinfected or sterilized by the Hospital’s Environmental Services staff.
   5. Upon satisfactory completion of these precautions, and after all final inspections and approvals by all appropriate parties, the temporary barriers may be removed.

3.7 RENOVATIONS TO EXISTING BUILDING ENCLOSURES:

A. When the existing building envelope is compromised, temporary means shall be provided, in order to maintain the building envelope (i.e., temporary roof, flashings, exterior skin, etc.) and to protect the existing building areas from weather, dust or fumes entering via intake air supplies.

B. Temporary provisions shall be provided, in order to maintain the existing building HVAC air balance and maintain a slightly positive relative pressure. Care shall be exercised during demolition of canopies and penthouses, installation of personnel hoists, temporary exits, etc, which affect the exterior envelope and vapor barrier.

C. Construction activity is not permitted within 25 feet of existing fresh air intakes. Placing equipment, supplies, and debris on or near screens and louvers of intake plenums is prohibited.

D. Compressed air shall not be used to clean airway dust and dirt. Implement dust control practices for all dirt and debris moving, including misting dirt with water whenever it is being moved or disturbed, and regularly misting debris boxes. Remove boxes daily.

PART 4 - FORMS

4.1 INDOOR AIR QUALITY PROTECTION – GENERAL:

<table>
<thead>
<tr>
<th>PROTECTION MEASURE</th>
<th>Major Renovations Additions with High Sensitivity</th>
<th>Major Renovations Additions with Moderate Sensitivity</th>
<th>Minor Renovations with Minimal Sensitivity</th>
</tr>
</thead>
</table>

HOSPITAL INFECTION CONTROL POLICY
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<table>
<thead>
<tr>
<th>Site Dust Control</th>
<th>Within Const. Area</th>
<th>At adjacent Hospita l Area</th>
<th>Within Const. Area</th>
<th>At Adjacent Hospit al Area</th>
<th>Within Const. Area</th>
<th>At Adjacent Hospit al Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler bare earth areas</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<td>Sprinkler access roadway</td>
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<tr>
<td>Seal window with tape</td>
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<td>Provide filter at intake louver</td>
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<td>Water sprinkle trash chute for dust control</td>
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<td>Keep trash chute remove from HVAC intake</td>
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<td>Barrier Protection</td>
<td>Rated wall (1hr) to deck and sealed</td>
<td>X</td>
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<td>Dust partition to deck or ceiling sealed</td>
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<td>Door &amp; window seals</td>
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<td>Frame with 1/8” tolerances</td>
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<td>Fire rated door with closer &amp; latch</td>
<td>X</td>
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<tr>
<td>Housekeeping</td>
<td>HEPA vacuum-damp mop daily or as needed</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Vacuum/mop daily &amp; on need</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Floor mats at each entry</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Air Quality Test/Monitoring</td>
<td>Baseline, monitoring and pre-occupancy</td>
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<td>Testing-on-going</td>
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<td>Baseline pre-occupancy</td>
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<td>Pre-occupancy testing</td>
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<td>Demolition</td>
<td>Ceiling tile access-water mist</td>
<td>X</td>
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<td>Disinfect with spray before disturbing</td>
<td>X</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>Cover &amp; seal demo transport container</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>Cover/seal new materials transport to area</td>
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<td>X</td>
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<td>Pressure Relationship</td>
<td>Negative at all times</td>
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<td>X</td>
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<td>Monitoring &amp; alarm</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Negative or neutral at all times</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Air Filtration</td>
<td>Construction area HEPA at exits</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Perimeter HEPA filtration</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>Return air HEPA filtration</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
</tbody>
</table>

**HOSPITAL INFECTION CONTROL POLICY**

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| Return air 2” foam filtration | X |
| Exhaust air to exterior – HEPA | X |
| Exhaust air to exterior – 2” foam filtration | X |

### 4.2 MINOR RENOVATION CHECKLIST:

**Complete the pre-construction checklist for projects with minor renovations prior to start of work.** Confirm that the following precautions have been or will be taken:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>ACCESS TO Affected AREAS has been authorized by Hospital Administration or Infection Control Officer before project begins.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Plant Operations and Environmental Services notified</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Notified other departments or divisions to coordinate work schedules.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>All occupants and patients are vacated within areas of construction.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Air vents blocked and sealed prior to start of work.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Dust mats provided at entrance to work areas.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Doors taped for projects where dust or fumes are anticipated.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>All wall penetrations and/or holes sealed.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Proper respiratory masks for workers are available per OSHA requirements.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Provisions for water-mist materials prior to demolition.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>A wet mop is available for dust control.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>A vacuum cleaner is available for dust control.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Plastic bags or covered sealed carts are available to remove debris.</td>
</tr>
</tbody>
</table>

Signed: ___________________________________________ Date: ___________________________________________

__________________________

Project Safety Manager

Signed: ___________________________________________ Date: ___________________________________________

__________________________

Hospital Representative

HOSPITAL INFECTION CONTROL POLICY
01 35 33 - 12
### 4.3 MAJOR RENOVATION CHECKLIST:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Complete the pre-construction checklist for projects with major renovations prior to start of work. Confirm that the following precautions have been or will be taken:</th>
<th>COMMENTS OR CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Access to affected areas has been authorized by Hospital Administration or Infection Control Officer before project begins.</td>
<td>Date notified:</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Plant Operations and Environmental Services notified</td>
<td>Date notified:</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Notified other departments or divisions to coordinate work schedules.</td>
<td>Date notified: Person Notified:</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>All occupants and patients are vacated within areas of construction.</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Air vents blocked and sealed prior to start of work.</td>
<td></td>
</tr>
</tbody>
</table>
| Yes | No | A means to provide “negative air” has been provided. (Check one:) | a. Using existing exhaust system.  
                  b. Using negative air machine to outside exhaust. |
<p>| Yes | No | Dust mats provided at entrance to work areas. |                                |
| Yes | No | Doors taped for projects where dust or fumes are anticipated. |                                |
| Yes | No | All wall penetrations and/or holes sealed. |                                |
| Yes | No | Proper respiratory masks for workers are available per OSHA requirements. |                                |
| Yes | No | Provisions for water-mist materials prior to demolition. |                                |
| Yes | No | A wet mop is available for dust control. |                                |
| Yes | No | A HEPA filtered vacuum cleaner is available for dust control. |                                |
| Yes | No | Plastic bags or covered sealed carts are available to remove debris. |                                |
| Yes | No | Construction barriers are installed air tight to deck, in order to isolate the construction renovation area. |                                |</p>
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>An ante-room is constructed for exit from work area to occupied hospital areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Existing supply and return ducts have been capped serving adjacent occupied hospital areas.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Direct entry/egress is provided for trash removal and employee entry. (If not, other provisions are required.)</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Demolition work will not compromise the existing building envelope and/or air balance.</td>
</tr>
</tbody>
</table>

Signed: ___________________________________________  Date: _____________________________

______________________________  Project Safety Manager

Signed: ___________________________________________  Date: _____________________________

______________________________  Hospital Representative

4.4 DAILY AIR QUALITY AND INFECTION MANAGEMENT CHECKLIST:

Date: _____________________________

Project Title: ____________________________________________________________

Location: _____________________________________________________________

<table>
<thead>
<tr>
<th>Construction Barricade</th>
<th>Yes</th>
<th>No</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Barricades sealed, no penetration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Walk off mats in place, clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Barricade doors have closers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Door frames gaskets, doors close and seal properly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Signs posted cautioning about spread of dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Adjacent ceiling area intact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Adjacent floor is clean, no dust tracked</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

2. **Negative Air**

a. Are relative air pressure confirmed negative
   Method used

b. Adjacent floor is clean, no dust tracked

c. All exterior windows and doors closed behind barricade

d. Negative air machines running

e. Negative air machines filter clean

f. Negative air discharge hoses in tact

**Jobsite**

HOSPITAL INFECTION CONTROL POLICY

01 35 33 - 14
HOSPITAL INFECTION CONTROL POLICY

Project area clean, debris removed daily
   Debris removed in suitable containers
   c. Debris removed at time specified

Comments:

3. Occupied Areas
a. Work authorized and scheduled
   Visqueen barricade in place, properly sealed
   Ceiling access tag posted
   Surrounding area clean

Inspected by:

Name: ___________________________________________  Title:
________________________________________________

Name: ___________________________________________  Title:
________________________________________________

END OF SECTION 01 35 33
SECTION 01 35 35

ABOVE CEILING WORK REQUIREMENTS

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

The requirements of this Section shall be incorporated into every section of the Work. All personnel working within this facility shall adhere to these Policies and Procedures.

1.1 DESCRIPTION OF WORK:

This is a general, summarized guide for personnel performing above ceiling construction activities in this facility.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- Section 01 10 00: Summary of the Work
- Section 01 35 33: Hospital Infection Control Policy
- Section 02 41 19: Selective Demolition
- Section 07 84 00: Firestopping
- Section 09 29 00: Gypsum Wallboard Systems
- Division 23: Relevant mechanical work
- Division 26: Relevant electrical work

1.3 COORDINATION:

Coordinate above ceiling work with other trades. Comply with governing and regulatory agencies having jurisdiction.

1.4 RESPONSIBILITY:

All contractors, subcontractors and vendors who are required to conduct business above the ceiling are responsible for obtaining an above ceiling permit from the Plant Operations Department.

It is the contractor’s, subcontractors’ and vendors’ responsibility to request a pre-construction above ceiling inspection to identify issues of concerns. If this inspection is not requested and completed, the contractor, subcontractor or vendor shall assume responsibility to bring all above ceiling penetrations and any system they were installing, moving or modifying, up to current applicable regulatory compliance standards. This includes, but is not necessarily limited to cabling, ducting, piping, medical air system and seismic hangers.

All contractors, subcontractors and vendors shall receive training by a designated representative from Plant Operations prior to any above ceiling work.

The contractor is responsible to ensure that there is a final inspection of their above ceiling work, by a representative from Plant Operations, prior to closing any ceilings.
1.5 ABOVE CEILING PERMIT:

All contractors, subcontractors and vendors shall be properly identified by a badge and have an above ceiling permit. The above ceiling permit shall be displayed in full view on the ladder(s) in the working area.

An example of an approved above ceiling permit is specified in paragraph 3.01 of this Specification Section.

The above ceiling permit shall be removed from the ladder(s) only by a designated representative from Plant Operations when the above ceiling work is completed and accepted.

PART 2 – GENERAL REQUIREMENTS

2.1 LADDERS:

All ladders used in above ceiling work shall not be made of any type of conductive material in order to protect the technician from electrical shock. All ladders shall have the required OSHA and safety labels clearly visible. Contractors shall have all their ladders clearly marked for the ease of identification. During the periods of above ceiling work, the immediate area around the ladder work area shall be cordoned off with safety orange colored cones, or other suitable, approved temporary protection barriers.

No materials, tools, ladders, etc. shall be left unattended in public areas at any time.

2.2 CEILING TILES:

Ceiling support systems shall not be compromised. Where work is to be performed above existing acoustical tile ceilings, the lay-in boards shall be carefully removed and stored until the work is completed.

During the periods of above ceiling work, the contractor shall ensure that no wires hang in a loop or loose that could cause injury to another person. If wire needs to hang down from the ceiling, they need to hang to the floor or above a height of 7 feet.

The ceiling tiles shall be reinstalled when the above ceiling work is suspended for a period of more than thirty (30) minutes. All ceilings shall be closed during meals, breaks and periods of extended above ceiling work suspensions.

All miscellaneous materials (trash, wall pieces, etc.) shall be removed from above the ceiling.

It is the contractor’s responsibility to ensure that a designated representative from Plant Operations conducts a pre-construction ceiling tile inspection and documents the number of damaged or broken ceiling tiles.

Upon completion of the above ceiling work and reinstallation of the ceiling tiles, it is the contractor’s responsibility to ensure that a designated representative from Plant Operations conducts a final ceiling tile inspection. The contractor shall be
responsible for replacement of all broken ceiling tiles resulting from above ceiling work.

Replace ceiling tiles after work has been completed in areas isolated to construction activities. Replace ceiling tiles daily, at the end of each work shift, in areas accessible to non-construction personnel.

2.3 PENETRATION SEALS:

All penetrations through rated barriers shall require proper fire stops. Provide materials classified by UL to provide fire or smoke barrier equal to time rating of construction being penetrated. The type of fire stop material shall be noted on the above ceiling permit.

All penetrations shall be completed in accordance with approved UL fire-rated assemblies.

<table>
<thead>
<tr>
<th>TYPE OF PENETRATION/LOCATION</th>
<th>HOUR</th>
<th>UL DRAWING</th>
</tr>
</thead>
<tbody>
<tr>
<td>GYPSUM/CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Pipe In Concrete</td>
<td>3</td>
<td>CAJ1155</td>
</tr>
<tr>
<td>Metal Pipe In Concrete</td>
<td>1-2</td>
<td>WJ1028</td>
</tr>
<tr>
<td>Metal Pipe In Gypsum</td>
<td>1-2</td>
<td>WL1054</td>
</tr>
<tr>
<td>Plastic Pipe In Concrete</td>
<td>3</td>
<td>CAJ2109</td>
</tr>
<tr>
<td>Plastic Pipe In Concrete</td>
<td>2</td>
<td>CAJ2169</td>
</tr>
<tr>
<td>Plastic Pipe In Gypsum</td>
<td>1-2</td>
<td>WL2075</td>
</tr>
<tr>
<td>Cables In Concrete</td>
<td>1-3</td>
<td>WL3122</td>
</tr>
<tr>
<td>Cables In Gypsum</td>
<td>1-2</td>
<td>WL3122</td>
</tr>
<tr>
<td>* Insulated Pipe In Concrete</td>
<td>2</td>
<td>CAJ5045</td>
</tr>
<tr>
<td>* Insulated Pipe In Gypsum</td>
<td>1-2</td>
<td>WL5025</td>
</tr>
<tr>
<td>* Insulated Duct In Gypsum</td>
<td>2</td>
<td>WL7018</td>
</tr>
</tbody>
</table>

* A sheetrock scab may be used around pipe or duct with or without insulation, secured on two sides with screws. Minimum annular space around pipe or insulation is one half an inch (1/2”). Space to be filled with FS-One intumescent Fire Stop sealant. Joint around sheetrock to be sealed.

All fire and smoke partitions shall be identified by stenciling the correct wording on the wall, above the ceiling. All walls, ceilings, slabs, etc. shall be free of penetrations after work is complete.

The contractor shall review all penetrations completed the previous day with a designated representative from Plant Operations prior to starting the next day’s above ceiling work.

2.4 MECHANICAL:

Mechanical items and equipment shall be installed minimum 12” above the ceiling, unless existing field conditions do not permit. Mechanical items shall not be attached to existing pipes, ducts, sprinklers, etc.

ABOVE CEILING WORK REQUIREMENTS
01 35 35 - 3
Small, flexible items (tubing, low voltage wiring, etc.) may be fastened by straps and supported from the structure above, or anchored to the wall. Do not obstruct existing valves, controls, etc.

All piping, ducting, seismic supports, piping hangers, duct hangers etc. are to be suspended in accordance with latest applicable regulatory codes and standards.

2.5 ELECTRICAL CONDUIT:

Separate hangers shall be installed for supporting conduits. Hangers and piping installed by other trades shall not be used to support electrical conduit.

Hangers and fittings shall be rust resistant, and do not need to be painted if completely concealed above ceilings. Prefabricated, adjustable metal channel framing and associated fittings may be substituted for hangers, if structurally equivalent. Straps shall be galvanized or cadmium plated; maximum spacing 5 feet on center, for conduits not mounted on hangers.

Conduits shall be installed minimum 12” above ceilings, unless existing field conditions do not permit.
Conduits shall be installed minimum 12” from steam or hot water piping running parallel with the conduit; minimum 6” where piping runs perpendicular to the conduit; minimum 3” from cold water piping.

Do not obstruct access to existing valves, controls, etc.

2.6 LOW VOLTAGE CABLES:

Low voltage cables shall be run in conduit, installed in cable trays, strapped with tie wraps, or strapped with cable holders. Cables shall not be hung or tied in any form or fashion to piping, ducting, ceiling hanger, pipe hanger, etc. or laid directly on top of ceilings or grids.

Low voltage cables run in conduit shall be permanently labeled at the junction box identifying the type of system (telephone, data, etc.) and its destination. Low voltage cables not in conduit shall have taps installed in junction boxes, with boxes permanently labeled. Cables shall be identified every twenty feet with non-tearable and/or non-removable tags.

Cables shall be installed minimum 12” above the ceiling, unless existing field conditions do not permit.
Straps or tie wire shall be installed every six feet on center of cable run. Do not obstruct access to existing valves, controls, etc. Cables shall not be strapped to existing plumbing, medical gas, sprinkler lines, ducts, etc.
Cables installed in walls above ceilings shall be inside a sleeve turned 90 degrees to enter walls, with minimum 6” on outside and inside of wall. Penetrations shall be fire sealed. Penetrations through decks and rated partitions shall be in conduit, extended minimum 6” on both sides of penetration, and filled with specified rated sealant.
PART 3 – FORMS

3.1 ABOVE CEILING PERMIT:

DATE:
CONTRACTOR:
NAME:
ADDRESS:
PHONE:
CONTACT PERSON:
PERSON APPLYING FOR PERMIT:
LOCATION OF WORK:
  a. Department:
  b. Room:
  c. Corridor:

TYPE OF WORK:

- Creating Penetrations
- Wiring
- Telephone
- Medical Gasses
- Air Conditioning ducts
- Insulation work
- Fire systems
- Tube systems
- Sewage systems
- Installing penetration stuffing tubes
- Cable
- Data
- Piping
- Seismic
- Lighting
- Nurse call
- Water systems

Project time period:
FROM: ________________________  TO: ______________________________

WALL PENETRATION TYPE

- Non Rated assembly
- Fire wall
- Rated assembly
- Smoke wall

End of Section 01 35 35
SECTION 01 40 00
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 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. 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 Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and -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 Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
   4. Specific test and inspection requirements are not specified in this Section.
C. Related Requirements:
   1. Section 01 21 00 "Allowances" for testing and inspecting allowances.
   2. Divisions 02 through 33 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 substantiate that proposed construction will comply with requirements.
B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

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

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 DELEGATED DESIGN

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

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities, provide contractors “Company Wide Quality Control Plan”.

B. Qualification Data: For Contractor's quality-control personnel.

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

D. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

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

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

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager may also serve as Project superintendent.

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

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

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

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

1.8 REPORTS AND DOCUMENTS

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

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

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

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

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

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

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

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
1. Automatic Sprinkler System: Certified by as required by state and municipality in which Project is located.

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 in material, design, and extent to those indicated for this Project.

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

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

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

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

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

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

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

1. Contractor responsibilities include the following:
   
a. Provide test specimens representative of proposed products and construction.
   
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   
d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

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

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

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

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

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

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Submit schedule within 30 days of date established for commencement of the Work. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

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

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

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

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

3.2 REPAIR AND PROTECTION
A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

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

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

**END OF SECTION 01 40 00**
SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 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.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
1.3 INDUSTRY STANDARDS

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

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

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
3. CDHS - California Department of Health Services; (See CDPH).
4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
6. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
7. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservicer.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00
SECTION 01 45 00

WINDSTORM CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.1 Related Documents

A. Drawings and general provision of the contract, including general and supplements/conditions and other Division 1 specification sections, apply to this section.

1.2 Summary

A. The provisions of this section are based upon the Texas Department of Insurance (TDI) windstorm inspection program.

B. All components and cladding and roof mounted equipment as well as the connection of the cladding and roof mounted equipment must meet or exceed the wind load requirements per the structural general notes of the structural drawings.

C. All exterior glazed openings of the building must be impact resistant or protected with an impact resistant covering. Exterior openings include exterior windows, exterior louvers, exhaust duct openings, exterior glazing systems, and exterior doors. Exterior opening protection for windborne debris must meet the requirements of an approved impact-resisting standard (Texas Windstorm) or ASTM E 1996 and ASTM E 1886. Refer to IBC 2015 with City of Corpus Christi for additional requirements for impact. The most stringent criteria shall govern.

Minimum Requirements shall be:

1. All exterior openings below 30'-0” above finished grade shall meet the requirements of the Large Missile Test of ASTM E 1996.
2. All exterior openings between 30'-0” and 60'-0” above finished grade shall meet the requirements of the Small Missile Test of ASTM E 1996

1.3 Definitions

A. Components and cladding: elements assembled to form the exterior walls, soffits, and roof systems that are either directly loaded by the wind or receive wind loads originating at relatively close locations, and that transfer those loads to the structure and main wind force resisting system. Examples: Curtain walls, exterior glass windows, soffit panels, roof sheathing, roll-up doors, exterior wall panels, exterior wall studs, roof panels, exterior doors, brick, exterior sheathing, louvers, etc.

B. Exterior wall openings: Openings that may be breached during high wind events.
Examples: curtain walls, windows, doors, louvers, over-head rollup doors, etc.

C. Roof mounted equipment; mechanical exhaust fans, roof top units, condensers, exterior ducts, etc.

1.4 Design Requirements

A. Wind loads (pressures) shall be determined from the project structural notes or from American Society of Civil Engineers (ASCE) 7-05 “Minimum Design Loads for Buildings and Other Structures” shall be utilized a 3 sec. wind speed $V=128$; $I=1.15$ Exposure C.

B. All serviceability checks shall be based on upon a 50 year (or greater) year return period wind pressure. Serviceability checks based upon a 25 or 10 year return period wind pressure are not acceptable.

C. Impact resistance for windborne debris shall be as determined by the Texas Windstorm Requirements per the IBC 2006 with the Texas Department of Insurance Windstorm Inspection Program Revisions.

D. Garza + McLain Structural Engineers the Owner’s selected wind storm inspector shall be responsible to file all paper work for TDI and perform the Windstorm Inspections. The Contractor shall provide all shop drawings including attachment for the products approved by TDI or the Florida Building Code. Products not approved by TDI or the Florida Building Code shall be signed and sealed by a professional engineer licensed in the State of Texas engaged in similar certification for a minimum of 7 years, certificates of testing, engineered sealed letters, sealed calculations showing wind and impact loading, and ICBO ESR reports with allowable fastener capacity shall be submitted to Garza + McLain. The attachment of all component and cladding items shall be kept in a binder on site. All items not meeting the above criteria shall be rejected and marked revise and resubmit.

E. Corrosion Resistance.

1. Open Areas: Metal connectors and fasteners located in open areas shall be either stainless steel and meet ASTM A167; hot dip galvanized after fabrication and meet ASTM A123 or A153; hot dip galvanized or galvannealed prior to fabrication and meet ASTM A653; Hot dip galvanized or electrogalvanized in accordance with ASTM A641; mechanically deposited zinc coatings in accordance with ASTM B695; or electrodeposited zinc coatings in accordance with ASTM B633.

Examples:
- Canopies
- Exterior wall coverings
- Roof coverings
- Ties veneer
1.5 Submittals

A. All components and cladding products listed in the Texas Windstorm Approved Product Index or the Florida Building Code shall have the appropriate product evaluation number indicated on the submittal and the approved product drawings shall be included in the submittal. Submittals without these items will be returned as revise and resubmit.

B. Components and cladding products not listed will require certification that they meet or exceed the design requirements of this section by the manufacturer and sealed by an engineer engaged in the review of similar materials for at least 7 years licensed in the State of Texas. Along with water and air infiltration data showing that the product meets or exceeds TDI requirements. The Engineered calculations must take into account missile impact if product is covering an exterior opening. In addition, all fasteners must be IBCO approved with ESR Reports attached. The load on fasteners must be less than or equal to values listed on ESR Report.

C. Installation instructions and drawing elevations indicating fasteners, minimum attachment requirements, and other necessary pertinent information for installation shall be submitted in the submittal. If these items are not included the submittal will be returned revise and resubmit with specified items.

D. The following shop drawings shall be submitted (This with a partial list and may not include all component and cladding items).

1. Connection of roof insulation and roofing
2. Exterior Doors
3. Exterior Metal Louvers
4. Exterior Finish/Trim
5. Exterior parapet caps
6. Roof Metal Closures
8. Exterior Glazing (Windows, Curtain Wall, etc.)
9. Exterior mounted lights
10. MEP roof mounted curbs
11. MEP roof exhaust fans
12. Metal Roof panels
13. Wood Blocking at roofs and parapets
14. Pre-engineered canopies
15. Exterior soffit panels and supplemental framing
16. Light poles and anchor rods
17. Aluminum decking
18. Exterior Sheathing
19. Cold Formed Metal Framing
20. Sun shades

1.6 Execution

A. The contractor and sub-contractor shall provide, and have available at the job site, all necessary installation instructions during construction for each exterior cladding component as specified.

B. Prior to covering or concealing the fasteners or connectors, the contractor shall notify the Architect/TDI Inspector such that an inspection for Windstorm certification can be performed. The Contractor shall communicate the upcoming construction schedule weekly with the Owners designated windstorm inspector such that inspections can be made without delay to the project. All Items listed above as well as the foundations, each elevated floor level, and exterior cladding steel support framing require TDI Inspections, see a partial list below.

Inspections are required for the following items (note this is a partial list and may not include all component and cladding items):

1. Drilled footings
2. Level 1 beams and slab
3. Elevated floor levels (if any)
4. Roof Structure
5. Connection of roof insulation and roofing
6. Exterior Doors
7. Exterior Metal Louvers
8. Exterior Finish/Trim
9. Parapet caps
10. Exterior sheathing
11. Exterior Glazing (Windows, Curtain Wall, etc.)
12. Exterior mounted lights
13. MEP roof mounted curbs
14. MEP roof exhaust fans
15. Pre-engineered canopies
16. Wood Blocking at roofs and parapets
17. Exterior metal panel
18. Exterior soffit panels and supplemental framing
19. Light poles and foundations
20. Aluminum deck
21. Exterior CFMF

C. Contractor shall furnish the Engineer of Record, upon completion, written confirmation/certification of the installation and materials used for all components and cladding is in conformance with requirements of this section as well as letters from each subcontractor installing the component materials stating that each item was installed per the manufacturer’s recommendations to meet Texas Windstorm Certification. In addition, the contractor shall write a letter to the Engineer of Record notarized stating that all items were installed per the contract documents and manufacturer’s recommendation for Windstorm without deviation.

END OF SECTION 01 45 00
SECTION 01 50 00
TEMPORARY FACILITIES

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 DESCRIPTION OF REQUIREMENTS:

A. Definitions: Specific administrative and procedural minimum actions are specified in this section, as extensions of provisions in General Conditions and other Contract Documents. These requirements have been included for special purposes as indicated. Nothing in this section is intended to limit types and amounts of temporary work required, and no omission from this section will be recognized as an indication by Architect or Engineer that such temporary activity is not required for successful completion of the work and compliance with requirements of Contract Documents. Provisions of this section are applicable to, but not by way of limitation, utility services, construction facilities, security/protection provisions, and support facilities.

1.3 QUALITY ASSURANCE:

A. General: In addition to compliance with governing regulations and rules/recommendations of franchised utility companies, comply with specific requirements indicated and with applicable local industry standards for construction work (published recommendations by local consensus "building councils").


D. Environmental Impact Statement: Comply with provisions of Owner's committed EIS, for development and operation of temporary facilities and construction activities.

E. Conservation: In compliance with energy/materials conservation, install and operate temporary facilities and perform construction activities in manner which reasonably will be conservative and avoid waste of energy and materials including water.
1.4 JOB CONDITIONS:

A. General: Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the work. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.

B. Conditions of Use: Install, operate, maintain and protect temporary facilities in a manner and at locations that will be safe, non-hazardous, sanitary and protective of persons and property, and free of deleterious effects.

PARTS 2 - PRODUCTS AND EXECUTION

2.1 TEMPORARY UTILITY SERVICES:

A. The types of services renovated include, but not by way of limitation, water, sewerage, electrical power, electronic data and telephones. Comply with service companies' recommendations on materials and methods, or engage service companies to install services. Locate and relocate services (as necessary) to minimize interference with construction operations.

2.2 TEMPORARY CONSTRUCTION FACILITIES:

A. The types of temporary construction facilities required, include, but not by way of limitation, enclosure of work, heat, ventilation, electrical power distribution, lighting, dust and noise partitions. Provide facilities reasonably required to perform construction operations properly and adequately.

B. Electrical Power: Use of existing electrical outlets in area of work will be allowed.

C. Lighting: Provide sufficient temporary lighting to ensure proper workmanship everywhere by combined use of daylight, general lighting, and portable plug-in task lighting. Provide general lighting with local switching which will enable energy conservation during periods of varying activity (work-in-progress, traffic only, security check, lock-up, etc.)

D. Access Provisions: Provide ramps, stairs, ladders and similar temporary access elements as reasonably required to perform the work and facilitate its inspection during installation. Comply with reasonable requests of governing authorities performing inspections.

1. Coordinate the location of temporary dust/construction partitions and access provisions with Architect prior to beginning installation.

2. In areas of renovation within existing facilities, provide temporary ramps, doors, corridors, etc., as required to maintain fire exits as required by the authority having jurisdiction.

2.3 SECURITY/PROTECTION PROVISIONS:
A. The types of temporary security and protection provisions required include, but not by way of limitation, barricades, and similar provisions intended to minimize property losses, personal injuries and claims for damages at Project area.

B. Storage of combustible and flammable materials shall be maintained outside of (and well detached from) the building(s). Storage of combustibles shall not be located inside the building(s).

C. The supply of flammable paints, solvents, oils, gas cylinders, etc., inside the building(s) shall be limited to that required for one day's use.

D. Cutting and welding operations present a severe hazard, and such work should be done outside of the building(s) whenever possible.

E. No smoking is allowed within the construction area.

F. All combustible waste and scrap materials shall be removed from the building on a daily basis. No "on-site" incineration shall be permitted.

G. Ready access for the Public Fire Department shall be maintained to all areas.

H. Temporary Interruption of Fire Protection System: The Contractor shall be responsible for implementing emergency measures, including continuous roaming fire watches that will maintain the integrity of the fire protection during periods of impairment to such system.

1. Notify the Service Center Director of Facilities and the local Fire Department that protection will be impaired. The information should include what systems will be out of service, for how long, and what areas will be affected.

2. Temporary emergency measures that shall be implemented include continuous roaming fire watches; discontinue any work involving cutting or welding, laying out and charging fire hoses that can be put into operation immediately.

3. Protection that is impaired should be restored as soon as possible but should not be allowed to continue overnight or over a weekend or holiday period. Once the work is commenced to correct the impairment, it should be continued until the work is complete and the system restored to service.

4. Advise all previously notified parties of the restoration of service at the first opportunity.

2.4 TEMPORARY SUPPORT FACILITIES:

A. The types of temporary support facilities required include, but not by way of limitation, field offices, storage sheds, sanitary facilities, drinking water, first aid facilities, bulletin board, private telephones, clocks, project identification signs, clean-up facilities, waste disposal service, and similar miscellaneous general services, all as may be reasonably required for proficient performance of the Work and accommodation of personnel at the
site including Owner’s and Architect's/Engineer's personnel. Discontinue and remove temporary support facilities, and make incidental similar use of permanent work of the project only when and in manner authorized by Architect/Engineer, and if not otherwise indicated, immediately before time of substantial completion. Locate temporary support facilities for convenience of users, and for minimum interference with construction activities.

B. Contractor’s Field Office: Provide adequate office space for field office personnel plus one spare work station for incidental use by subcontractor’s personnel, suitably finished, furnished, equipped and conditioned.

2.5 CONSTRUCTION SCHEDULES AND REPORTS

A. Monthly Update Schedule

1. Submit a detailed analysis describing deviations from the previous month’s schedule as follows:
   a. Description of the critical path and network diagram changes;
   b. Additions/deletions of activities;
   c. Reasons and impact of activities not starting or finishing on projected early/late dates; and
   d. Reasons and remedies for activities which adversely affect the Contract Completion Date.

B. Daily Reports

1. The Contractor shall prepare a daily report concerning construction site events and submit copies to the A/E and Project Manager on a weekly basis or as otherwise designated. These reports shall contain the following information:
   a. List of subcontractors on site;
   b. Approximate count of personnel on site;
   c. General weather conditions, with high and low temperatures;
   d. Meetings and significant decisions;
   e. Accidents and unusual events;
   f. Stoppages, delays, shortages and or losses;
   g. Meter readings and similar recordings;
   h. Orders/requests from governing authorities;
i. Change Orders received and/or implemented;

j. Services connected or disconnected;

k. Equipment or systems tests or start-ups; and

2. Partial completion, occupancies.

C. Temporary Facilities and Controls

1. Describe prime considerations of project coordination as affected by:
   a. Use of existing site facilities, including storage space, paved drives and parking areas, utility connections, and toilets;
   b. Interruption of Facility utility services; and
   c. Temporary offices, telephone service and toilet facilities.

2. A designated area on site for construction debris recycling and disposal will be provided on site. Location to be coordinated with on-site facility supervisor.
   a. Provide area for collection, storage and retrieval of separated debris for recycling. These bins or roll-offs shall be clearly marked for:

   1) Wood
   2) Concrete
   3) Metal
   4) Cardboard (covered)
   5) Trash

END OF SECTION 01 50 00
SECTION 01 60 00

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
B. Related Requirements:
   1. Section 01 21 00 "Allowances" for products selected under an allowance.
   2. Section 01 23 00 "Alternates" for products selected under an alternate.
   3. Section 01 25 00 "Substitution Procedures" for requests for substitutions after bid/pricing.
   4. Section 01 42 00 "References" for applicable industry standards for products specified.

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

D. 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 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

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 Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

5. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.
1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product 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 and vandalism. Comply with manufacturer's written instructions.

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

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store cementitious products and materials on elevated platforms.
   5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   7. Protect stored products from damage and liquids from freezing.
   8. 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.
1. Manufacturer’s Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer’s Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

1.8 PROHIBITION ON INCORPORATION OF HAZARDOUS MATERIALS
A. Architect and its consultants have not knowingly specified for incorporation into the work, materials or products containing hazardous materials or toxic substances (including asbestos).

B. Contractor (including its subcontractors, sub-subcontractors, and material suppliers/fabricators under its control) is prohibited from incorporating any material or products into the work containing hazardous materials or toxic substances.

C. As part of completed materials and products list required herein, Contractor shall assemble, for the Owner’s records, the Material Safety Data Sheets (MSDS) for all materials and products incorporated into the work. These MSD sheets shall be updated upon final completion of the work to incorporate changes which have occurred during the course of the work due to approved substitution requests and other modifications. Architect will not review, nor approve, the MSD sheets. The Contractor, also as a pre-requisite to achieving final completion, shall provide a certificate to the Owner indicating that no hazardous or toxic materials or products were incorporated into the work.

D. Architect and its consultants are not responsible for the presence of hazardous materials or toxic substances in or around the work, nor the exposure to persons who construct or subsequently occupy the work. The Architect will not provide certifications regarding the presence or absence of such materials or substances.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES
A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.


B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.

3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
   b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
      1) Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.

4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
   b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
      1) Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.

5. 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.
6. **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.
   a. Submitted in accordance with provisions of Section 01 25 00.

7. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or 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 requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
   a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.

C. **Visual Matching Specification:** Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

D. **Visual Selection Specification:** Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
   1. **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.
   2. **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.
   3. **Full Industry Range:** Where Specifications include the phrase "full industry range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from any listed manufacturer's product line that includes both standard and premium items.
   4. "Custom Color as selected by Architect" or "to match color on file in Architect's office", "match Architect's sample" means that the color selected is custom and requires custom formulations and submissions of color to obtain Architect's approval prior to application.

E. **Allowances:** Refer to individual Specification Sections and "Allowance" provisions in Division 01 for allowances that control product selection and for procedures required for processing such selections.

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

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

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

3. Evidence that proposed product provides specified warranty.

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

5. Samples, if requested.

B. Submitted in accordance with provisions of Section 01 25 00.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00
SECTION 01 73 00
EXECUTION

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of Owner-installed products.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.
B. Related Requirements:
   1. Section 01 10 00 "Summary" for limits on use of Project site.
   2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
   3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
   4. Section 07 84 13 "Penetration Fire Stopping" for patching penetrations in fire-rated construction.

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

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For land surveyor.
B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. **Extent:** Describe reason for and extent of each occurrence of cutting and patching.

2. **Changes to In-Place Construction:** Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.

3. **Products:** List products to be used for patching and firms or entities that will perform patching work.

4. **Dates:** Indicate when cutting and patching will be performed.

5. **Utilities and Mechanical and Electrical Systems:** List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. **Landfill Receipts:** Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

E. **Certified Surveys:** Submit two copies signed by land surveyor.

F. **Final Property Survey:** Submit 2 copies showing the Work performed and record survey data.

### 1.5 QUALITY ASSURANCE

A. **Land Surveyor Qualifications:** A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. **Cutting and Patching:** Comply with requirements for and limitations on cutting and patching of construction elements.

1. **Structural Elements:** When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. **Operational Elements:** Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Mechanical systems piping and ducts.
   f. Control systems.
   g. Communication systems.
   h. Fire-detection and -alarm systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction.

3. **Other Construction Elements:** Do not cut and patch other construction elements or components in a manner that could change their load-carrying
capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.

b. Membranes and flashings.

c. Exterior curtain-wall construction.

d. Sprayed fire-resistive material.

e. Equipment supports.

f. Piping, ductwork, vessels, and equipment.

g. Noise- and vibration-control elements and systems.

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

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination of the Site and Records of Existing Construction and Conditions: Examine the site, the records of existing construction, and the conditions under which the Work is to be performed. Notify the Architect immediately if existing conditions discovered will affect the Work as shown on the Contract Documents.

B. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
EXECUTION

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1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Conditions Furnished in the Contract Documents: The Contract Documents are based upon the information furnished to the Architect by the Owner. Such information is available from the Owner. The records are furnished for information only and may not represent all conditions that will be encountered. The records of existing site represent conditions known to the Owner. Other construction, of which no records are available, may be encountered. Dimensions of existing construction are based on information provided to the Architect by the Owner. The Contractor and each subcontractor shall field verify dimensions of existing conditions.

D. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

E. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.

2. List of detrimental conditions, including substrates.

3. List of unacceptable installation tolerances.

4. Recommended corrections.

F. 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. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to
3.3 CONSTRUCTION LAYOUT

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

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

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

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

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

3.4 FIELD ENGINEERING

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

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
   1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
   2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 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 minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Precautions Against Movement or Settlement: The Contractor shall take precautions, including bracing, shoring, underpinning, or other retaining structures, to guard against movement or settlement of existing or new construction. Assume responsibility for the design, safety, and support of such construction, and for movement, settlement, damage, or injury resulting from the construction.

C. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

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

E. 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.

F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

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

I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. 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.

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

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

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

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

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

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

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

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

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

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

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

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

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

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

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

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 in-place 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate 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: Patch, repair, or rehang in-place 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 weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
   1. Refer to Construction Documents for Owner Furnished Equipment. Coordinate with Owner’s representative the delivery schedule for each item provide by Owner.
   2. 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.
   3. Pre-installation Conferences: Include Owner’s construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner’s work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
      a. Use containers intended for holding waste materials of type to be stored.
   4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

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

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

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

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

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

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

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in sections found within this specification.

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

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

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

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 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.

END OF SECTION 01 73 00
SECTION 01 77 00
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 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.
B. Related Requirements:
   1. Section 01 73 00 "Execution" for progress cleaning of Project site.
   2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   4. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.
   5. Divisions 03 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

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

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

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. “Substantial Completion” is the stage in the progress of Work when Work or designated portion thereof is sufficiently complete in accordance with Contract Documents so Owner can occupy or utilize Work for use which it is intended.

1. Work will not be considered suitable for Substantial Completion review until all systems and equipment are operational; all designated or required governmental inspections and certifications have been made and posted, designated instruction of Owner's personnel in operation of systems and equipment has been completed, operation and maintenance data has been satisfactorily turned over to the Owner, and all finishes are in place. In general, the only remaining Work shall be minor in nature, such that the Owner could occupy project or designated portion thereof on following day, and completion of Work by Contractor would not materially interfere or hamper Owner's normal business operations.

2. Contractor shall certify that all remaining Work will be completed within a reasonable time, agreed upon by Owner, following date of Substantial Completion. Failure of the Contractor to complete the Work within the stipulated time shall automatically re-institute the provisions for liquidated damages due Owner as contained elsewhere in Contract Documents, or as provided by law for such period of time as may be required by Contractor to fully complete Work whether Owner has occupied the Project or not.

B. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

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

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   a. Texas Accessibility Standards (TAS) inspection.
   b. State accessibility standards inspection.
   c. Windstorm Construction inspection.

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

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

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

D. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
6. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, property surveys, and similar final record information.
7. Advise Owner of changeover in heat and other utilities.
8. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10. Complete final cleaning requirements, including touchup painting.
11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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

1.7 FINAL COMPLETION PROCEDURES
A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

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

4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or substantially similar form, and forward to Architect at time of request for Substantial Completion inspection. Architect may use same form for Architect's supplemental items to Contractor.

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.
4. Submit list of incomplete items in the following format:

1.9 TEXAS ACCESSIBILITY STANDARD INSPECTION

A. Coordinate inspection at Substantial Completion of facility in accordance with rules and regulation of the Texas Department of Licensing and Regulations (TDLR) for the purpose of determining compliance with the Texas Accessibility Standards. Inspector must be licensed with the Texas Department of Licensing and Regulations to perform the required inspection.

B. Upon receipt of Inspector’s report, immediately make corrections of any reported non-compliant items. Provide documentation to Owner of completed corrective measures.

1.10 OPERATION AND MAINTENANCE MANUALS

A. Refer to Section 01 78 23.
1.11 PROJECT RECORD DOCUMENTS
   A. Refer to Section 01 78 39.

1.12 SUBMITTAL OF PROJECT WARRANTIES
   A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
   B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
   C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
      1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-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.
      4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
   D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING
   A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. 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.
   f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   g. Sweep concrete floors broom clean in unoccupied spaces.
   h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   j. Remove labels that are not permanent.
   k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   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 or that display contamination with particulate matter on inspection.
   o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."
3.2 REPAIR OF THE WORK

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

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

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

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

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

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

END OF SECTION 01 77 00
SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
      1. Operation and maintenance documentation directory.
      2. Emergency manuals.
      3. Operation manuals for systems, subsystems, and equipment.
      4. Product maintenance manuals.
      5. Systems and equipment maintenance manuals.
   B. Related Requirements:
      1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS
   A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
   B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS
   A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
      1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
      2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
   B. Format: Submit operations and maintenance manuals in the following format:
         a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
         b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.

B. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Construction Manager.
   7. Name and contact information for Architect.
   8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label
describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   5. Power failure.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer’s name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Section 01 78 39 "Project Record Documents."

G. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23
PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.
B. Related Requirements:
   1. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
   2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   3. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS
A. Record Drawings: Comply with the following:
   1. Initial Submittal:
      a. Submit one paper-copy set(s) of marked-up record prints.
      b. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   2. Final Submittal:
      a. Submit PDF electronic files of scanned record prints and three set(s) of prints.
      b. Print each drawing, whether or not changes and additional information were recorded.
   3. Final Submittal:
      a. Submit record digital data files and three set(s) of record digital data file plots.
      b. Plot each drawing file, whether or not changes and additional information were recorded.
B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

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

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

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

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

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

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

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

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

1. Format: Same digital data software program, version, and operating system as the original "Issue for Construction" Contract Drawings.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Architect for resolution.

   a. Architect makes no representations as to the accuracy or completeness of Electronic Drawings as they relate to the Contract Drawings.
   b. Digital Data Software Program: The electronic files will be made available in the digital data software program in which they were produced by the Architect. Contractor is responsible for any necessary conversions to an alternate software program.
   c. See Section 01 33 00 “Submittal Procedures” for requirements related to use of Architect’s digital data files.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
   1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
   2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

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

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

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

2.3 RECORD PRODUCT DATA

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

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

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

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

END OF SECTION 01 78 39
SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
B. Allowances: Furnish demonstration and training instruction time under the Demonstration and Training Allowance as specified in Section 01 21 00 "Allowances."

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

1.4 CLOSEOUT SUBMITTALS
A. Demonstration and Training: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name of Architect.
      c. Name of Construction Manager.
d. Name of Contractor.
2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder.
4. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE
A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION
A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM
A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections:
1. Motorized doors.
2. Equipment.
3. Fire-protection systems, including fire alarm, fire pumps, and fire-extinguishing systems.
4. Intrusion detection systems.
5. Conveying systems.
6. Medical equipment,
7. Laboratory equipment, including laboratory air and vacuum equipment and piping.
8. Heat generation, including boilers, feed-water equipment, pumps, and water distribution piping.
9. Refrigeration systems, including chillers, cooling towers, condensers, pumps, and distribution piping.
10. HVAC systems, including air-handling equipment, air distribution systems, and terminal equipment and devices.
11. HVAC instrumentation and controls.
12. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
13. Lighting equipment and controls.
14. Communication systems, including intercommunication, clocks and programming, voice and data equipment.

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

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

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

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.

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

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

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

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.
3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

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

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

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 79 00
SECTION 02 41 19
SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of ceilings.
2. Demolition and removal of selected portions of millwork.
3. Salvage of existing items to be reused or recycled as noted on plans.

B. Related Requirements:

1. Section 01 10 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01 73 00 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store at location on campus as directed by facilities management.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
SELECTIVE DEMOLITION
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1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

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

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure hospital's facilities and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of hospital's continuing occupancy of portions of existing building and of hospital's partial occupancy of completed Work.

D. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.
1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

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

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

1. During selective demolition, hospital will remove the following items:
   a. Fixed Medical equipment.
   b. Office equipment.
   c. Medical equipment and furniture.

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

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials, if identified during ABS pre-construction inspection, will be removed by Hospital before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Hospital. Hazardous materials will be removed by Hospital under a separate contract.

E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is included in appendix of this document for your use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Hospital will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be
selectively demolished because of building operations or processes performed there.

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

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

1.10 WARRANTY
   A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
   B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
   B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Hospital. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

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

D. Survey of Existing Conditions: Record existing conditions by use of measured drawings preconstruction photographs or video.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

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

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent spaces and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Protect walls, ceiling, floors, and other existing finishes on pathway from existing MRI procedure room to exterior during removal of old equipment and delivery of new MRI equipment to procedure room.
5. Cover and protect furniture, furnishings, and equipment that have not been removed.
6. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished. Refer to structural plans for shoring requirements (If required) to existing concrete foundation, columns, and roof during demolition and reconstruction.

1. Strengthen or add new supports when required during progress of selective demolition.

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

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically by phase, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 12 hours after flame-cutting operations.


7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

10. Dispose of demolished items and materials promptly.

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

C. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Hospital.

4. Transport items to Hospital’s storage area as designated by Hospital.

5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.

4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

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

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

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

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

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

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

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 02 41 19
SECTION 02 90 00
CUTTING AND PATCHING

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

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

1.1 DESCRIPTION OF REQUIREMENTS:

"Cutting-and-patching: shall include, but is not necessarily limited, to the cutting and patching of nominally completed work, in order to accommodate the coordination of work, the installation of other work, to obtain samples for testing or for similar purposes. Refer to other sections of these Specifications for specific cutting-and-patching requirements and limitations applicable to individual units of work.

Related Work Specified Elsewhere:

Section 01 10 00: Summary of Work

PART 2 – PRODUCTS

2.1 MATERIALS:

Except as otherwise indicated or approved by the Architect or Engineer, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable.

Comply with the requirements, and use of materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.

Floor-stone Materials: Provide floor-stone underlayment products in type of material as recommended by the manufacturer for use intended. Apply each pass in thickness as recommended by the manufacturer to obtain maximum bond.

Required Floor Stone work shall be transitioned to existing over such a distance to prevent a noticeable change of elevation while walking across the surfaces.

PART 3 – EXECUTION

3.1 PREPARATION:

Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work. Provide adequate protection of other work during cutting-and-patching to prevent damage; provide protection of the Work from adverse weather exposure.
3.2 CUTTING AND PATCHING:

Employ skilled tradesmen to perform cutting-and-patching. Except as otherwise indicated or approved by the Architect or Engineer, proceed with cutting-and-patching at the earliest feasible time, in each instance, and perform the Work promptly. Cut work by methods least likely to damage work to be retained and work adjoining. Review proposed procedure with original Installer where possible, and comply with his recommendations. Where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.

Cut, fit or patch work that may be required to make its several parts fit together properly. Do not endanger any work by cutting, excavating or otherwise altering the Work or any parts of it.

It shall be the responsibility of the various Contractors to supply in advance proper and sufficient detailed information, thereof.

In the event of failure to supply this advance information, all cutting as may be required shall be done only after the review of the Architect and at the expense of the negligent party.

Each Contractor shall do all cutting, fitting or patching of his work that may be necessary to make said work coordinate with the work of other Contractors, the timing of the work by the various Contractors shall be determined by the General Contractor.

Prior to penetrating any load bearing walls or any structural members not indicated or detailed in the Contract Documents, the Contractor shall first submit written notice and obtain permission in writing from the Engineer, Construction Manager and Architect before commencing with any such work.

Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work. Restore exposed finishes of patched areas; where necessary, extend finish restoration onto retained work, adjoining in a manner, which will eliminate evidence of patching.

Whenever any pipe, conduit, ducts, steel members, brackets, or equipment, including any material penetrating or passing through a wall, ceiling or floor, the voids in the construction shall be completely sealed with cement grout, plaster or a fire-resistive material, embedding the sealing material the full thickness of the wall, ceiling or floor.

Where surfaces are exposed, finish with the same materials specified in the Finish Schedule or material that is on constructed surfaces.

Do not endanger the Work of any other Contractors by cutting or otherwise altering their work.

Do not cut or alter the Work of any other Contractor except with the written consent of
the Affected Contractor.

Any cost caused by defective or ill-timed work shall be borne by the Contractor.

END OF SECTION 02 90 00
SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 STANDARDS

A. The following Standards are listed in this specification:

- ASTM A36: Specification for Carbon Structural Steel
- ASTM A153: Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM A185: Specification for Welded Steel Wire Fabric for Concrete Reinforcement
- ASTM A193-B7: Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Services
- ASTM A307: Specification for Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
- ASTM A496: Specification for Deformed Steel Wire for Concrete Reinforcement
- ASTM A615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- ASTM A706: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
- ASTM C33: Standard Specification for Concrete Aggregates
- ASTM C39: Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C94: Specification for Ready Mixed Concrete
- ASTM C150: Specification for Portland Cement
- ASTM C171: Standard Specification for Sheet Materials for Curing Concrete
- ASTM C192: Practice for Making and Curing Concrete Test Specimens in the Laboratory
- ASTM C260: Specification for Air-Entraining Admixtures for Concrete
- ASTM C309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C418: Test Method for Abrasion Resistance of Concrete by Sandblasting
- ASTM C494: Standard Specification for Chemical Admixtures for Concrete
- ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- ASTM C881: Specification for Epoxy-Resin-Base Bonding Systems for Concrete
1.3 DESCRIPTION OF WORK

A. Extent of concrete work is shown on drawings, including schedules, notes and details which show size and location of members and type of concrete to be poured. Furnish all labor, materials, services, equipment and hardware required in conjunction with or related to the forming, delivery and pouring of all poured-in-place concrete work.

B. Concrete paving and walks are specified in Division 2.

C. Use of regional materials is required refer to “Division 1”

D. This section includes items which meets specified criteria for the use of post-industrial recycled steel.

1.4 QUALIFICATIONS

A. The concrete supplier shall have a minimum of two years experience in manufacturing ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment. The supplier must be certified according to the National Ready Mixed Concrete Association’s Certification of Ready Mixed Concrete Production Facilities.

B. The concrete contractor shall have a minimum of two years experience with installation of concrete similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful -service performance.

1.5 QUALITY ASSURANCE

The Contractor is responsible for quality control and quality assurance, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACI 301 - "Specifications for Structural Concrete for Buildings".

2. ACI 117 - "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 318 - "Building Code Requirements for Reinforced Concrete".


B. Document Conflict and Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect/Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.

C. Inspection and Testing of the Work: Materials and installed work may require testing and retesting, as directed by the Architect/Engineer, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense. See Testing Laboratory section of the Specifications.

Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.

D. Acceptance Criteria for Concrete Strength: The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:

1. The average of all sets of three consecutive strength tests equal or exceed the required f'c.

2. No individual strength test falls below the required f'c by more than 500 psi.

A strength test shall be defined as the average strength of two cylinder breaks tested at the strength age indicated on the drawings for that class of concrete.

E. Responsibility for Selection and Use of Concrete Admixtures and Chemical Treatments: The Contractor shall be responsible for selecting admixtures and surface treatments that are compatible with the intended use of the concrete including all final surface treatments called for within this or other specifications or on the structural or architectural drawings. The Contractor is responsible for following the manufacturer's instructions for the use of their product including abiding by any limitations placed by the manufacturer on the use of any of its products.

F. Survey for Anchor Rods: The Contractor shall use a qualified, licensed professional engineer/land surveyor to lay out the proper location of all embedded anchor rods for columns above before they are encased in concrete. The surveyed locations of such elements shall be submitted to the Architect/Engineer for record.

1.6 PREINSTALLATION CONFERENCES

A. Mix Design Conference: At least 30 days prior to submittal of concrete design mixes, the Contractor shall hold a meeting or telephone conference to review the detailed requirements for preparing the concrete mix designs. Participants shall include representatives from the Contractor, Owner's Testing Laboratory, Concrete Supplier, and Engineer.

B. Pre-Concrete Conference
1. At least 7 days prior to beginning concrete work, the Contractor shall conduct a meeting to review the proposed mix designs and to discuss required methods and procedures to produce concrete construction of the required quality. Also review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for materials inspection, testing and certifications. The contractor shall send a pre-concrete conference agenda to all attendees 7 days prior to the scheduled date of the conference.

2. 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:

   Contractor's Superintendent
   Laboratory responsible for the concrete design mix
   Laboratory responsible for field quality control
   Concrete Subcontractor
   Ready-Mix Concrete Producer
   Owner's and Architect's/Engineer's Representative

3. 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 be transmitted to the following for information purposes:

   Owner's Representative
   Architect
   Engineer-of-Record

4. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least 7 days prior to the scheduled date of the conference.

1.7 SUBMITTALS

A. Section 01 300 00 – Administrative Requirements: Coordination and Project conditions.

B. Shop Drawings: Submit shop drawings for all reinforcing steel and related accessories for the Engineer's approval. Shop drawings shall show arrangement and layout, bending and assembly diagrams, bar schedules, stirrup spacing, splicing and laps of bars and shall be prepared in accordance with CRSI Standards. Submit details for steel templates that are to be used when placing dowels for columns, plinths, or pilasters out of foundation elements or for placing anchor bolts for structural steel members.

C. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including admixtures, patching compounds, epoxies, grouts, waterstops, joint systems, curing compounds, dry-shake finish materials, hardeners, sealers and others as requested by Architect/Engineer.

D. Samples: Submit samples of materials specified if requested by Architect/Engineer, including names, sources and descriptions.

E. Mix Designs: Submit mix designs and the Concrete Mix Design Submittal Form located at the back of this specification section for each class of concrete that is to be provided
for the project as specified herein. Submit the qualifying test data that supports each mix design as required herein.

F. Material and Mill Certificates: Provide material and mill certificates as specified herein and in the Testing Laboratory section of the Specifications. The Manufacturer and Contractor shall sign the material and mill certificates certifying that each material item complies with specified requirements. Provide certification from admixture manufacturers that chloride ion content complies with specified requirements.

G. Construction Joints: Submit drawing of proposed construction joint locations in concrete for slab on grade, mat foundations, and walls. Submit any additional or changed reinforcing that is required at construction joints that differs from that shown on the drawings.

H. Minutes of preconstruction conference.

I. Surveys: Submit reports certifying that all anchor rods for columns above are in their proper location prior to placing of concrete.

1.8 PROVISION FOR OTHER WORK

A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking, grounds and other fastening devices required for attachment of work. Properly locate in cooperation with other trades and secure in position before concrete is poured. Do not install sleeves in any concrete slabs, beams or columns except where shown on the drawings or upon written approval of the Architect/Engineer.

B. Protect adjacent finish materials against damage and spatter during concrete placement.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

Refer to the drawings for classes and strengths of concrete required.

A. Portland Cement: ASTM C 150, Type I or Type III, or ASTM C 1157, Type GU or HE unless otherwise approved by the Architect/Engineer. For concrete exposed to salt air or salt water, provide Type II or Type V cement.

Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Architect/Engineer and the Owner's Testing Laboratory.

B. Fly Ash: ASTM C 618, Class C or F. (25% Minimum).

C. Normal Weight Aggregates: ASTM C33 and as herein specified.

D. Water: Clean, fresh, drinkable, free of oils, acids or organic matter harmful to concrete.

E. Air-Entraining Admixture: ASTM C260. Provide air entrainment as specified in Table 4.2.1.of ACI 318-99 in all concrete exposed to freezing and thawing. Interior steel
troweled surfaces subjected to vehicular traffic shall not have more than 3% entrained air. Surfaces scheduled to receive hardeners shall not have more than 3% entrained air.

Subject to compliance with requirements, provide one of the following products and manufacturers:

"Darex-AEA" or "Daravair"; W. R. Grace & Co.
"MBAE90" or "Micro-Air"; Master Builders
"Sika AER"; Sika Corporation
"Air Mix" or "AEA-92"; The Euclid Chemical Company, Inc.
"Boral Air 30" or "Boral Air 40", Boral Material Technologies, Inc.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

F. Water-Reducing Admixture: ASTM C494, Type A. See maximum permissible chloride ion content in concrete specified below.

Subject to compliance with requirements, provide one of the following products and manufacturers:

"Pozzolith 322N" or "Polyheed 997"; Master Builders
"Plastocrete 161"; Sika Chemical Corp.
"Eucon WR-75 or WR-91"; The Euclid Chemical Company, Inc.
"WRDA with Hycol"; W.R. Grace & Co.
"Boral NW" or "Boral LW", Boral Material Technologies, Inc.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

G. Mid-Range Water-Reducing Admixture: ASTM C494, Type A and Type F. See maximum permissible chloride ion content in concrete specified below.

Subject to compliance with requirements, provide one of the following products and manufacturers:

"Polyheed 997", Master Builders
"Eucon MR", The Euclid Chemical Company, Inc.
"Sikament HP", Sika Chemical Corp.
"Mira 70", W.R. Grace & Co.
"Boral X15" or "Boral X20", Boral Material Technologies, Inc.

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G. See maximum permissible chloride ion content in concrete specified below.

Subject to compliance with requirements, provide one of the following products and manufacturers:

"ADVA" or "Daracem"; W.R. Grace & Co.
"Rheobuild 1000" or "Rheobuild 3000FC"; Master Builders
"Sikament"; Sika Chemical Corp.
"Eucon 37 or Eucon 537"; The Euclid Chemical Company, Inc.
"Boral SP" or "Boral RD", Boral Material Technologies, Inc.
Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

I. Water-Reducing, Accelerator Admixture (Non-Corrosive, Non-Chloride): ASTM C494, Type C or E. See maximum permissible chloride ion content in concrete specified below.

Subject to compliance with requirements, provide one of the following products and manufacturers:

- "Polarset"; W.R. Grace & Co.
- "Pozzutec 20"; Master Builders
- "Accelguard 80"; The Euclid Chemical Company, Inc.
- "Plastocrete 161FL", Sika Chemical Co.
- "Boral AcN", Boral Material Technologies, Inc.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D. See maximum permissible chloride ion content in concrete specified below.

Subject to compliance with requirements, provide one of the following products and manufacturers:

- "Daratard-17"; W.R. Grace & Co.
- "Pozzolith 100XR" or "Pozzolith 300R"; Master Builders
- "Plastiment"; Sika Chemical Co.
- "Eucon Retarder 75"; The Euclid Chemical Company, Inc.
- "Boral R-Series", Boral Material Technologies, Inc.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

K. Calcium Chloride and Chloride Ion Content:

1. Calcium chloride or admixtures containing more than 0.5% chloride ions by weight of the admixture are not permitted.

2. The maximum water-soluble chloride ion concentration in hardened concrete at ages from 28 to 42 days contributed from all ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits specified in ACI 318-99 Table 4.4.1. Water-soluble chloride ion tests shall conform to ASTM C1218.

The Concrete Supplier shall certify on the Mix Design Submittal Form that the chloride ion content in all concrete mix designs used on the project will not exceed limits stated above.

L. Certification: Written conformance to all the above mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of mix design review by the Engineer.

2.2 FORMWORK MATERIAL
A. Forms For Exposed Finish Concrete: Unless otherwise specified, formwork for exposed concrete surfaces shall consist of plywood, metal, metal-framed plywood, or other acceptable surface. Formwork shall provide a continuous straight and smooth surface conforming to the joint system as specified on the Architect's drawings. Form material shall have sufficient thickness to withstand pressure of concrete without bow or deflection. Plywood shall be exterior grade overlaid plywood complying with U.S. Product Standard PS-1 and as follows:

1. "A-C or B-B High Density Overlaid Concrete Form", Class 1 or better.
2. Medium density overlay, Class 1 or better, mill-release agent treated and edge sealed.
3. Structural 1, B-B, or better, mill oiled and edged sealed.
4. "B-B (Concrete Form) Plywood", Class 1, or better, mill-oiled and edge sealed.

Each piece shall bear a legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Unless otherwise specified, formwork for unexposed concrete surfaces shall be constructed with plywood, lumber, metal or other acceptable material. Lumber shall be dressed on at least two edges and one side for tight fit.

C. Nails and Fasteners: Use only galvanized nails and fasteners for securing formwork in structures exposed to weather or unconditioned spaces such as garages, canopies and porte-cocheres.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Exposed Surfaces: Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.
2. Damproofed Surfaces: Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
3. Exposed to Weather or Unconditioned Space: Provide galvanized form ties in surfaces that will be exposed to weather or in an unconditioned space in the final structure.

E. Chamfer Strips: Provide wood, metal, PVC, or rubber strips, ¾ by ¾ inch, minimum.

2.3 RELATED MATERIALS

A. Moisture Retarder: Provide moisture retarder cover chosen from products specified below over prepared base material where indicated.
1. Vapor Retarder: A flexible, preformed sheet membrane having a water-vapor permeance rate no greater than 0.006 perms when tested in accordance with ASTM E 154, section 7 and otherwise conforming to ASTM E 1745, Class B.

Products: Subject to compliance with requirements, provide one of the following products:

- “Griffolyn Vaporguard”, Reef Industries
- “Premolded Membrane with Plasmatic Core”, W.R. Meadows
- “Stego Wrap Vapor Barrier (15 mil)”, Stego Industries, LLC

B. Liquid Membrane-Forming Curing and Curing and Sealing Compounds:

1. High-Solids, Solvent-Based Curing and Sealing Compound with Moderate Yellowing Characteristics: Liquid type membrane-forming curing and sealing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class B, 28% solids content minimum. Moisture loss shall be not more than 0.32 Kg/m² in 72 hours when applied at 300 sq. ft./gal. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile or terrazzo or other coating or finishing products. Subject to compliance with requirements, provide one of the following products:

- "Kure-N-Seal 30,' Sonneborn Chem-Rex
- "Super Rez-Seal," Euclid Chemical Co.
- "Masterkure N-Seal HS," ChemRex, Inc., MBT Protection and Repair Division
- "Dress & Seal 30", L & M Construction Chemicals, Inc.

Submit manufacturers certification that product conforms to the requirements specified and is compatible with all subsequent surface treatments.

2. High-Solids, Solvent-Based, Non-Yellowing Curing and Sealing Compound: Liquid type membrane-forming curing compound, acrylic type, complying with ASTM C1315, Type 1, Class A. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile or terrazzo or other coating or finishing products.

Products: Subject to compliance with requirements, provide the following product or equivalent products:

- "Lumiseal Plus"; L.M. Construction Chemicals
- "Super Diamond Clear"; Euclid Chemical Co.

Submit manufacturers certification that product conforms to the requirements specified and is compatible with all subsequent surface treatments.

3. Water-Based Dissipating Resin Type Curing Compound: Curing Compound shall be a dissipating resin type, which chemically breaks down after approximately 4 weeks. Membrane forming compound shall meet ASTM C309, Types 1 and 1D Class B.

Products: Subject to compliance with requirements, provide one of the following:

- "Kurez DRVox", Euclid Chemical Company
"L&M Cure R", L&M Construction Chemicals

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with any covering or surface treatments to be applied.

4. High Solids, Water-Based Acrylic Curing and Sealing Compound with Moderate Yellowing Characteristics: Water-Based membrane-forming curing and sealing compound conforming to ASTM C 1315, Type 1, Class B, classified as low odor. Product shall provide a maximum moisture loss of 0.030 Kg/m² in 72 hours when applied at a coverage rate of 300 sf/gallon. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile or terrazzo or other coating or finishing products.

Products: Subject to compliance with above requirements, provide one of the following products or equivalent products:

"Safe Cure and Seal (J-19)"; Dayton Superior Corp.
"Super Aqua-Cure VOX"; Euclid Chemical Co.
"Dress & Seal, 30 WB"; L & M Construction Chemicals, Inc.
"Masterkure 200W"; ChemRex, Inc., MBT Protection and Repair Division

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with any covering or surface treatments to be applied.

5. High Solids, Water-Based, Non-Yellowing Curing and Sealing Compound: Water based membrane-forming curing and sealing compound, acrylic type, complying with ASTM C1315, Type 1, Class A classified as low odor. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile or terrazzo or other coating or finishing products.

Products: Subject to compliance with requirements, provide one of the following:

"Super Diamond Clear Vox", Euclid Chemical Company
"Lumiseal 30 WB", L&M Construction Chemicals
"Kure 1315", Sonneborn-ChemRex

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with any covering or surface treatments to be applied.

C. Chemical Curing/Floor Hardener Compound: Sodium silicate based compound which reacts with concrete constituents to harden the surface, resulting in a surface having a maximum abrasion coefficient of 0.25 cm³/cm² when tested in accordance with ASTM C 418.

Products: Subject to compliance with requirements, provide one of the following:

"Eucosil," Euclid Chemical Co.
"Sonosil," Sonneborn Building Specialties
"Day-Chem S.1-Cure (J-13), Dayton Superior

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all coverings and surface treatments to be applied.
D. Evaporation Control: Monomolecular film forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss in hot weather conditions.

Products: Subject to compliance with requirements, provide one of the following:

- "Eucobar"; Euclid Chemical Company
- "E-Con"; L & M Construction Chemical, Inc.
- "Confilm"; ChemRex, Inc., MBT Protection and Repair Division
- "Sure Film (J-74)"; Dayton Superior
- "SikaFilm"; Sika Chemical Co.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all coverings and surface treatments to be applied.

E. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.

Products: Subject to compliance with requirements, provide one of the following:

- "Surfhard"; Euclid Chemical Co.
- "Lapidolith"; Sonneborn-Chem-Rex
- "Day-Chem Hardener (J-15)"; Dayton Superior

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all coverings or surface treatments to be received.

F. Water and Chloride Ion Repelling Penetrating Sealer: Clear, solvent based Silane or Siloxane penetrating sealer which reacts chemically with the concrete surface to function as a Chloride Ion screen with a minimum 90% factor when tested in accordance with NCHRP #244 and applied in accordance with the manufacturer's recommendation.

Products: Subject to compliance with requirements, provide one of the following:

- "Euco-Guard 100 or 200"; Euclid Chemical Co.
- "Masterseal SL 40%"; ChemRex, Inc., MBT Protection and Repair Division
- "Penetrating Sealer 40-VOC"; Sonneborn-Chem-Rex

G. Water and Chloride Ion Repelling Penetrating Sealer: Clear, water based Silane or Siloxane penetrating sealer which reacts chemically with the concrete surface to function as a Chloride Ion screen with a minimum 83% factor when tested in accordance with NCHRP #244, Series II and applied in accordance with the manufacturer's recommendation.

Products: Subject to compliance with requirements, provide one of the following:

- "Euco-Guard Vox"; Euclid Chemical Co.
- "Sikaguard 701W"; Sika Chemical Co.
- "Aquapel or Aquapel Plus" L&M Construction Chemicals"

H. Bonding Compound: Polyvinyl acetate or acrylic base, for use in cosmetic and/or nonstructural repairs.
Products: Subject to compliance with requirements, provide one of the following:

1. Acrylic or Styrene Butadiene:
   "Day-Chem Ad Bond (J-40)"; Dayton Superior
   "SBR Latex"; Euclid Chemical Co.
   "Daraweld C"; W. R. Grace.
   "SikaLatex", Sika Chemical Co.

2. Polyvinyl Acetate (Interior Use Only)
   "Euco Weld"; Euclid Chemical Co.
   "Everweld"; L & M Construction Chemicals, Inc.
   "Superior Concrete Bonder (J-41)," Dayton Superior

I. Epoxy Products: Two component material suitable for use on dry or damp surface, complying with ASTM C 881, for use in all structural concrete repairs.

1. Products for Crack Repair:
   "Sikadur 35 Hi Mod LV"; Sika Chemical Company – injection type
   "Sikadur 52", Sika Chemical Company – injection type
   "Sikadur 55 SLV", Sika Chemical Company – gravity feed
   "Eucopoxy Injection Resin," Euclid Chemical Company
   "Sure-Inject (J-56)," Dayton Superior
   "Epoofil SLV", Sonneborn-ChemRex

2. Products for Epoxy Mortar Patches:
   "Sikadur Lo-Mod LV"; Sika Chemical Corporation.
   "Euco 452 LV," Euclid Chemical Company
   "Sure Grip Epoxy Grout (J-54)," Dayton-Superior
   "Epoofil", Sonneborn-ChemRex

3. Products for Epoxying Bolts or Reinforcing Steel into Concrete: Conform to ASTM C881-90, Type IV, Grade 3,Class A, B, & C except gel times.
   "Sikadur 31 Hi-Mod Gel"; Sika Corporation
   "Euclid 452 Gel",Euclid Chemical Company
   "Sure Anchor I (J-S1)"; Dayton Superior
   "Epo Gel" or "Rapid Gel", Sonneborn Chem-Rex
   "HSE 2421 System", Hilti Fastening Systems
   "Epcon C6 System", ITW Ramset/Red Head
   "Power-Fast Injection Gel", Powers Rawl

4. Products for Epoxying Steel Plates to Concrete: Conform to ASTM C881-90, Type IV, Grade 3, Class A, B, & C except gel times.
   "Sikadur 31 Hi-Mod Gel"; Sika Corporation
   "Euclid 452 Gel," Euclid Chemical Company
   "Sure Anchor I (J-S1)," Dayton Superior
   "Epo Gel" or "Rapid Gel," Sonneborn Chem-Rex
Substitutions may be considered provided complete technical information and job references are furnished to the Engineer for approval prior to commencement of work.


Products: Unless specified otherwise, provide one of the following:

- "Sikatop 111"; Sika Chemical Co.
- "Flo-Top" or "Flo-Top 90"; Euclid Chemical Co.
- "Levelayer I," Dayton Superior

K. Polymer Patching Mortar: Polymer and microsilica modified cementitious based compounds.

Products:

Horizontal

- "Thin Top Supreme, Concrete Top Supreme," Euclid Chemical
- "Sikatop 121 or 122," Sika Chemical
- "Emaco R310CI," ChemRex, Inc., MBT Protection and Repair Division
- "Sonopatch 100 or 300", Sonneborn-ChemRex

Vertical or Overhead

- "Verticoat/Verticoat Supreme," Euclid Chemical
- "Sikatop 123," Sika Chemical
- "Emaco R320CI," ChemRex, Inc., MBT Protection and Repair Division
- "Sonopatch 200", Sonneborn-ChemRex

L. High Strength Flowing Repair Mortar: For forming and pouring structural members, or large horizontal repairs, provide flowable one-part, high strength microsilica modified repair mortar with 3/8" aggregate. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.

Products:

- "Road Patch", Sonneborn-ChemRex

M. Anti-Corrosive Epoxy/Cementitious Adhesive: Water-based epoxy/cementitious compound for adhesion and corrosion protection or reinforcing members (20 hour maximum open time).

Products:

- "Armatec 110," Sika Chemical Co.
- "Sonoprep", Sonneborn-ChemRex

N. Expansion Bolts in Concrete:
1. **ICBO Approval:** Only concrete anchors approved by the International Conference of Building Officials (ICBO) with a published Research Report shall be approved for use.

2. **Type:** All expansion bolts in concrete shall be only wedge type expansion or undercut bolts.

3. **Interior Use:** All expansion bolts, nuts and washers for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.

4. **Exterior or Exposed Use:** All expansion bolts, nuts and washers for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized bolts, nuts and washers shall conform to ASTM A 153. Stainless steel bolts shall be manufactured from 300 series stainless steel and nuts and washers from 300 series or Type 18-8 stainless steel.

5. **Nuts and Washers:** Nuts and washers shall be furnished from the manufacturer and used with the bolts.

6. **Acceptable Products and Manufacturers:**
   
   "Kwik-Bolt II" or HSL Heavy Duty Sleeve Anchor"; Hilti Fastening Systems.
   "Trubolt Wedge Anchors," ITW Ramset/Red Head
   "Sleeve-All", Simpson Strong-Tie Co., Inc.

   Other manufacturers will be acceptable only if approved by ICBO with an ICBO Research Report submitted for Engineer review.

O. **Adhesive Bolts in Concrete- Sealed Capsule Type:**

1. **Type:** Adhesive bolts in concrete shall consist of a specially prepared threaded steel rod meeting the requirements of ASTM A 307, A36, or A193-B7 and a sealed capsule containing a two part system of modified vinylester resin and hardener. Adhesive anchors containing polyester resin shall not be used.

2. **Exterior Use:** Adhesive bolts used in exterior, exposed, potentially wet environments and for attachment of exterior cladding materials shall have threaded rods manufactured from ASTM A 153 galvanized steel or 300 series stainless steel. Nuts and washers shall also be galvanized or stainless steel.

3. **Nuts and Washers:** Nuts and washers shall be furnished from the manufacturer and used with the bolts.

4. **Products:** Subject to compliance with requirements, provide one of the following:

   "HVA Adhesive System"; Hilti Fastening Systems.
   "Chem-Stud" or "Hammer-Capsule", Powers-Rawl Fastening, Inc.
   "Maxima 7" or "Impact", ITW Ramset/Red Head
   "VGC 50", Simpson Strong-Tie Co., Inc.
Other manufacturers will be acceptable only if approved by ICBO with an ICBO Research Report submitted for Engineer review.

P. Adhesive Bolts in Concrete – Two-Part Injectable Type:

1. Type: Adhesive bolts in concrete shall consist of a threaded rod steel rod meeting the requirements of ASTM A307, A36 or A193-B7 and a two component adhesive system contained in side by side packs connected to a mixing nozzles which thoroughly mixes the components as it is injected into the hole.

2. Exterior Use: Adhesive bolts used in exterior, exposed, potentially wet environments and for attachment of exterior cladding materials shall have threaded rods manufactured from ASTM A 153 galvanized steel or 300 series stainless steel. Nuts and washers shall also be galvanized or stainless steel.

3. Nuts and Washers: Nuts and washers shall be furnished from the manufacturer and used with the bolts.

4. Products: Subject to compliance with requirements provide one of the following:

   "Epcon A7", ITW Ramset/Red Head
   "HIT HY-150", Hilti Fastening Systems
   "Epoxy-Tie ET", Simpson Strong-Tie Co., Inc.

Q. Reglets: Where resilient or elastomeric sheet flashing or bituminous membrane are terminated in reglets, provide reglets of not less than 26 gage galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

R. Contraction Joint-Filler Material for Slabs-on-Grade: Provide a 2-component semi-rigid, 100% solids epoxy having a minimum shore A hardness of 75 when tested in accordance with ASTM D2240. Subject to compliance with requirements, provide one of the following:

   "Euco 700", Euclid Chemical Co., Inc.
   "Spec-Joint CJ", Conspec Marketing and Manufacturing Co., Inc.
   "Masterfill 300 I", ChemRex, Inc., MBT Protection and Repair Division

S. Bondbreaker for Construction Joints in Slabs-on-Grade: A dissipating bondbreaking compound containing no silicones, resins, or waxes, and that conforms to ASTM C309. Subject to compliance with requirements, acceptable manufacturers include the following:

   "Sure-Lift", Dayton Superior Corporation, Inc.
   "Tilt-Eez", Conspec Marketing and Manufacturing Co., Inc.

2.4 PROPORTIONING AND DESIGN OF CONCRETE MIXES

The Contractor shall submit for approval by the Engineer and Owner's Testing Laboratory, at least 15 working days prior to the start of construction, concrete mix designs and the Concrete Mix Design Submittal Form located at the end of this specification section for each class of concrete indicated on the structural drawings and in the Specifications. The Contractor shall not begin work with a particular mix until that mix design has been approved.
A. Mix Design Conference: At least 30 days prior to submittal of concrete design mixes, the Contractor shall hold a meeting or telephone conference to review the detailed requirements for preparing the concrete mix designs. Participants shall include representatives from the Contractor, Owner's Testing Laboratory, Concrete Supplier, and Engineer.

B. The Contractor, acting in conjunction with his Concrete Supplier and his Testing Laboratory, shall submit in writing, with his mix designs, the method used to select mix proportions. Either of the following methods, as outlined in ACI 318, may be used.

1. Field Experience Method
2. Laboratory Trial Mixture Method

When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301 and ACI 211. When Laboratory trial batches are used to select concrete proportions, the procedure as outlined in ACI 318 shall be followed. Prepare test specimens in accordance with ASTM C192 and conduct strength tests in accordance with ASTM C39. Proportioning without field experience or trial mixtures is not permitted.

C. Required types of concrete and compressive strengths shall be as indicated on the Structural Drawings.

D. All mix designs shall state the following information:

1. Mix design number or code designation by which the Contractor shall order the concrete from the Supplier.
2. Structural member for which the concrete is designed (i.e. columns, shear walls, footings, etc.).
3. Wet and dry unit weight.
4. 28 day compressive strength.
5. Aggregate type, source, size, gradation, fineness modulus.
6. Cement type and brand.
7. Fly ash or other pozzolan type and brand (if any).
8. Admixtures including air entrainment, water reducers, accelerators, and retarders.
10. Proportions of each material used.
11. Water cement ratio and maximum allowable water content.
12. Method by which the concrete is intended to be placed (bucket, chute, or pump).
13. Required average strength qualification calculations per ACI 318 5.3.1 and 5.3.2. Submit separate qualification calculations for each production facility that will supply concrete to the project.

14. Documentation of Average strength (trial mix data or field test data) per ACI 318 5.3.3. When field test data is used to qualify average strength, submit separate documentation for each production facility that will supply concrete to the project.

15. Field test data submitted for qualification of average strength under ACI 318 5.3.1, 5.3.2 and 5.3.3 shall include copies of the Concrete Testing Agency's reports from which the data was compiled.

16. All other information requested in the Concrete Mix Design Submittal Form located at the end of this specification section.

E. Concrete Suppliers Record of Quality Control: The concrete supplier's past record of quality control shall be used in the design of the concrete mixes to determine the amount by which the average concrete strength $f_{cr}$ should exceed the specified strength $f'c$ as outlined in ACI 318. If a suitable record of test results is not available, the average strength must exceed the design strength by the amount as specified in ACI 318. After sufficient data becomes available from the job, the statistical methods of ACI 214 may be used to reduce the amount by which the average strength must exceed $f'c$ as outlined in ACI 318.

F. Fly Ash: Fly ash replacement of cement shall not exceed 25% (one part fly ash max. to three parts cement) by weight.

G. Aggregate: Provide aggregates from a single source for exposed concrete. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1 1/2 in.) or 8% - 22% for smaller top size aggregates (1 in. or 3/4 in.) retained on each sieve below the top size and above the No. 100.

H. Admixtures:
   1. Admixtures to be used in concrete shall be subject to the approval of the Engineer and Owner's Testing Laboratory.
   2. Quantities of admixtures to be used shall be in strict accordance with the manufacturers instructions.

I. Adjustments of Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Such mix design adjustments shall be provided at no additional cost to the Owner. Any adjustments in approved mix designs including changes in admixtures shall be submitted in writing with the specified Concrete Mix Design Submittal Form to the Engineer and Owner's Testing Laboratory for approval prior to field use.

J. Chloride Ion Content: A written submittal shall be made with each mix design proposed for use on the project that the chloride ion content from all ingredients including admixtures will not exceed the limits specified in this section of the Specifications.
2.5 CONCRETE MIXES

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, "Ready Mixed Concrete" and Testing Laboratory section of the specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Request inspections or reinforcing steel and testing of concrete.

3.2 FABRICATION AND CONSTRUCTION OF FORMWORK

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

B. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 117.

C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Construct forms so as to limit the offset between adjacent pieces of formwork facing material in accordance with the following classifications as defined in ACI 117. The offset limits shall apply to both abrupt and gradual variations in the surface.

1. Class A, 1/8 inch, for surfaces prominently exposed to public view in the completed structure.

2. Class B, ¼ inch, for surfaces scheduled to receive plaster, stucco, or wainscoting.

3. Class C, ½ inch, for all other surfaces.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
G. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and patch forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

H. Chamfer exposed corners and edges as indicated, using specified chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

I. Form Ties: Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1 1/2" inside concrete and will not leave holes larger than 1" diameter in concrete surface.

J. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

3.3 CLEANING AND TIGHTENING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and all other debris just prior to concrete placement. Retighten forms and bracing prior to concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.4 TOLERANCES

A. Unless specified otherwise, all tolerances for concrete formwork shall conform to ACI Standard 117, "Standard Tolerances for Concrete Construction and Materials". Before concrete placement the Contractor shall check lines and levels of erected formwork and make any corrections and adjustments as required to ensure proper size and location of concrete members and stability of forming systems. During concrete placement the Contractor shall check formwork and supports to ensure that forms have not displaced and that completed work will be within specified tolerances.

3.5 FABRICATION AND DELIVERY OF REINFORCEMENT

A. Bending and Forming: Fabricate bars of indicated sizes and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do not heat reinforcement for bending. Bars with kinks or bends not scheduled will be rejected.

B. Marking and Shipping: Bundle reinforcement and tag with suitable identification to facilitate sorting and placing. Transport and store at site so as not to damage material. Keep sufficient supply of tested, approved and proper reinforcement at the site to avoid delays. Maintain reinforcing bars free of mud, dirt, grease, or other coating.

3.6 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as herein specified.

B. Before placing and again before concrete is placed, clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.
C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolster, spacers and hangers, as required. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide metal spreaders and spacers to hold steel in position. Support steel at proper height upon approved chairs.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus two inches and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction. Welded wire fabric shall be furnished and placed in flat sheets only.

F. Coordinate with other trades and expedite materials and labor to avoid omissions and delay.

G. Install waterproof membrane or moisture barrier as specified prior to placing steel for concrete slabs-on-grade.

H. Extend reinforcement continuous through construction joints unless otherwise shown on the drawings or, if approved on the shop drawings, provide dowels of sufficient length to develop the full tension or compression strength of the bar as applicable.

I. Slab-on-Fill Joint Dowel Bars: Support slab-on-grade joint dowel bars independently of support for slab reinforcement on soil supported slab bolsters or specially manufactured cradles such that dowel bar remains parallel to slab surface and at right angles to joint during concreting operations. Lightly coat the exposed end of the dowel with a paraffin-base lubricant, asphalt emulsion, form oil, or grease or use a dowel bar sleeve specifically manufactured for the purpose of preventing a bond between the dowel and the concrete.

J. Provide and place additional reinforcing steel at all sleeves and openings in beams, slabs and walls as specified on the drawings. Where sleeves or openings not shown on the drawings interrupt the reinforcement, consult with Engineer for instructions for placing and splicing of bars. Provide required additional reinforcing steel at no additional cost to the Owner.

3.7 REINFORCING STEEL SPACING AND COVERAGE

A. Reinforcing Steel Coverage: Reinforcing steel coverage should conform to the requirements specified below. Cover specified shall be considered minimums that may require increasing where reinforcing steel intersects for different member types. Cover in structural members not specified below shall conform to the requirements of ACI 318-99 Section 7.7 unless specified otherwise on the drawings.

1. Foundation Members

   a. Grade Beams - 1 1/2" top, 3" bottom, 2" sides
   b. Sump Walls, Pit Walls - 2" both faces
   c. Underreamed Footings - 3" sides
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d. Drilled Piers - 3” sides

e. Interior Slab on Grade - centered in slab

f. Exterior Slab on Grade - 2” top cover for one layer of steel
   - 2” top cover, 3” bottom cover for two layers of steel

B. Reinforcing Steel Spacing: Comply with the requirements of ACI 318-99, Section 7.6.

3.8 SPlicing REINFORCING STEEL

A. Provide splice type (tension lap splice, compression lap splice, compression end bearing splice, or mechanical anchorage tension splice) as indicated on the drawings. Splice reinforcing bars only at locations shown on the structural drawings and approved shop drawings. Unauthorized or unscheduled splices not approved by the Engineer in writing will not be accepted.

B. All lap splices in reinforcing steel shall be contact lap splices unless detailed otherwise on the drawings.

C. Maintain proper cover between reinforcing bars at splices.

D. Lap unscheduled reinforcing bars not otherwise specified a minimum of 30 bar diameters at splices. Lap welded wire fabric a minimum of one full wire mesh plus two inches.

3.9 WELDING REINFORCING STEEL

A. Welding reinforcing steel is permitted only where specifically shown on the drawings. All welding shall conform to AWS D1.4 "Structural Welding Code - Reinforcing Steel". Only weldable reinforcing steel conforming to ASTM A706 or deformed bar anchors conforming to ASTM A496 shall be permitted. ASTM A615 bars may not be welded for structural use.

B. Scheduled or detailed reinforcing steel shall not be tack welded for any reason.

3.10 SLUMP LIMIT

A. The slump, as measured in the field where concrete cylinders are taken, shall be within plus or minus 1 inch of the design slump noted on the Mix Design Submittal Form. Water may be added to the concrete in the field only to the extent that the prescribed water-cement ratio noted in the Mix Design Submittal Form is not exceeded.

3.11 JOINTS IN CONCRETE

A. Construction Joints: Locate and install construction joints as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Architect/Engineer.

1. Keyways: Provide keyways with a depth of one tenth of the member thickness (1 1/2” minimum or as shown on the drawings) in construction joints only where shown on the drawings.
2. Joint Construction: Place construction joints in the center one third of grade beams and as shown on the drawings for slabs-on-grade and walls unless shown otherwise. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise shown on the drawings. Dowels that cross construction joints shall be supported during concreting operations so as to remain parallel with the slab or wall surface and at right angles to the joint. Submit all construction joint locations as a shop drawing submittal.

3. Waterstops: Provide waterstops in construction joints as indicated on the Architectural and Structural Drawings. 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.

4. Isolation Joints in Slabs-on-Ground: Construct isolation joints (without dowels) in slabs-on-ground at points of contact between slabs on ground and vertical surfaces only where specifically detailed on the drawings. Provide construction joints with dowels at all locations unless isolation joints are detailed.

5. Contraction (Control) Joints in Slabs-on-Ground: Maximum joint spacing shall be 36 times the slab thickness or 20 feet, whichever is less and at a minimum on column lines unless otherwise noted on the drawings. Use one of the two following methods (sawed or formed) to create the joints.

   a. Sawed Joints
      (1) Primary Method: Early-Entry, dry-cut method, by Soff-Cut International, Corona, CA (800) 776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 1 to 4 hours after final finish as soon as the concrete surface is firm enough to not be torn or damaged by the blade at each saw cut location. Use 1/8 inch thick blade, cutting 1 1/4" inch into the slab.
      (2) Optional Method (where Soff-Cut System method equipment is not available): Use a conventional saw to cut joints within 4 to 12 hours after finishing as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/8 inch thick blade, cutting to a depth of 1/4 of the slab thickness but not less than 1 inch.

   b. Formed Joints: Form contraction joints by inserting premolded plastic hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. The depth is to be 1/4 the slab thickness, but not less than 1 inch. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

   c. Joint Filler
      (1) Remove dirt and debris from the joint by vacuuming immediately prior to filling joint. Clean the joint of curing compounds and sealers.
      (2) Filler material shall be applied to the joints when the building is under permanent temperature control, but no less than 90 days after slab construction.
(3) Strictly following the manufacturer's recommended procedure for installing filler material.

d. The Contractor shall protect the joints from damage caused by wheeled traffic or other sources during construction until a joint-filler material (if specified) has been installed.

3.12 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Install reglets to receive top edge of foundation sheet waterproofing where specified by the Architect, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles and other conditions.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

C. Do not install sleeves in concrete slabs, pier caps, footings or walls except where shown on the structural drawings or approved by the Architect and Engineer.

D. Securely fasten embedded plates, angles, anchor bolts and other items to be built into the concrete after casting is prohibited.

3.13 CONCRETE PLACEMENT

A. 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.

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

C. Comply with ACI 301 and as herein specified.

1. 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 weak. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

2. 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.
3. 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.

4. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer 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.

5. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

6. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

7. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface free of humps or hollows before excess moisture or bleedwater appears on the surface. Do not disturb slab surfaces prior to beginning finishing operations.

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

9. Placing Concrete by Pump: If concrete is placed by using a pump, the grout used for pump priming must not become a part of the completed structure unless an engineered grout design mix and grout location are approved in advance by the Engineer.

3.14 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide rough form finish for formed concrete surfaces not exposed-to-view in the finish work and in parking garages unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: Provide smooth form finish for formed concrete surfaces exposed-to-view (except parking garage, unless noted otherwise), or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting, veneer plaster or other similar system or to a surface that is to receive a smooth rubbed finish or grout cleaned finish. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections exceeding 1/8 inch in height removed and smoothed.

C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled or specified concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
D. Grout Cleaned Finish: Provide grout cleaned finish to scheduled or specified concrete surfaces which have received smooth form finish treatment.

1. Combine one part portland cement to 1-1/2 parts fine sand by volume, and 50:50 mixture of acrylic or styrene butadiene based bonding admixture and water to consistency of thick paint. Proprietary additives may be used at Contractor’s option. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.

2. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

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

3.15 MONOLITHIC SLAB FINISHES

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

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo and other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerance specified below. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance as specified below. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin film finish coating system. After floating, begin first trowel finish operation by hand or power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a level surface to a tolerance as specified below. Grind smooth surface defects which would telegraph through applied floor covering system.
D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified above, then immediately follow with slightly scarifying surface by fine brooming.

E. Non-Slip Broom Finish: Apply non-slip broom finish to ramps less than 6% slope, exterior concrete platforms, steps and ramps and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Rake Finish: Provide a rake finish to all ramps exceeding a 6% slope. Finish shall be applied perpendicular to direction of traffic.

After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.16 CONCRETE FINISH MEASUREMENT AND TOLERANCES

A. Definitions:

1. Flatness - a measure of a concrete surfaces curvature or deviation from a planar surface. Concrete surfaces that are not flat are wavy or bumpy.

2. Levelness - A measure of a concrete surfaces tilt or inclination from a horizontal plane. Concrete surfaces that are not level are sloped or tilted.

3. $F_F$ Flatness F-Number - The flatness F-Number $F_F$ measures floor curvature or flatness and for any floor section or overall floor area is defined as follows:

$$F_F = \frac{4.57}{(3 \times Sq)} + q$$

Where $\tilde{q}$ is the mean value and Sq the standard deviation of all floor q readings. A q reading is defined as the difference in slope between three successive points along any test measurement line on the floor surface that are twelve inches apart.

4. $F_L$ Levelness F-Number - The levelness F-Number $F_L$ measures floor inclination from a horizontal plane and for any floor section or overall area is defined as follows:

$$F_L = \frac{12.5}{(3 \times Sz)} + z$$

Where $\tilde{z}$ is the mean value and Sz the standard deviation of all floor z readings. A z reading is defined as the difference in elevation between two successive points along any test measurement line on the floor surface that are 10 feet (120") apart.

Measurement of $F_L$ is not applicable for floors that are intentionally inclined or cambered, for elevated structural floors that can deflect from the time the floor is poured to the time it is measured, and for unshored form surfaces.
B. Measurement Standard: All floors should be measured for flatness and levelness according to ASTM E 1155 "Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System".

C. Time Period for Measurement and Reporting: Measurement of the finished concrete surface profile for any test section shall be made when requested by the Owner's Representative at his option. All measurements shall be made by the Owner's Testing Laboratory or designated party within 24 hours after completion of finishing operations. For structural elevated floors measurement shall also be made prior to removal of forms and shores. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete. The Contractor shall take immediate action to correct any work that is outside specified tolerances as outlined later in this section.

D. Measuring Equipment: The concrete surface profile shall be measured using equipment manufactured for the purpose such as a Dipstick Floor Profiler as manufactured by the Edward W. Face Company in Norfolk, Virginia, F-Meters manufactured by Allen Face & Company in Norfolk, Virginia, optical, or laser means or other method specified in ASTM E 1155.

E. Two-Tiered Measurement Standard: Each floor test section and the overall floor area shall conform to the two-tiered measurement standard as specified herein.

1. Minimum Local Value (MLV). The minimum local $F_F/F_L$ values represent the absolute minimum surface profile that will be acceptable in any one floor test section.

2. Specified Overall Value (SOV). The specified overall $F_F/F_L$ values represent the minimum values acceptable for all combined floor test sections representing the overall floor.

SOV and MLV $F_F/F_L$ values are specified later in this section for each portion of the structure.

F. Floor Test Sections: For purposes of this specification a floor test section is defined as the smaller of the following areas:

1. The area bounded by column and/or wall lines.

2. The area bounded by construction and/or control joint lines.

3. Any combination of column lines and/or control joint lines.

Test sample measurement lines within each test section shall be multidirectional along two orthogonal lines as defined by ASTM E 1155.

The precise layout of each test section shall be determined by the Owner's testing agency and shall be submitted for Architect/Engineer review and approval.
G. Tolerance on Floor Elevations: Construction tolerance on absolute floor elevation from the specified elevation as shown on the drawings shall be as specified below, taken from ACI 117:

1. Slab-on-Grade Construction - + 3/4".
2. Top surfaces of formed slabs measured prior to removal of supporting shores - + 3/4".
3. Top surfaces of all other slabs - + 3/4".

The tolerance on relative elevation difference between points on the floor shall be defined by the $F_L$ Levelness F-Number as prescribed below.

H. Construction Requirements to Achieve Specified Floor Finish Tolerances:

1. Forms shall be properly leveled, in good condition and securely anchored including special attention to ends and transitions.
2. Bearing surfaces for straightedges such as form edges or previously poured slabs shall be kept clean of laitance, sand, gravel, or other foreign elements.
3. Screeds shall be maintained in good condition with true round rolling wheels and level cutting edges. The use of optical sighting equipment such as lasers is recommended for checking levelness and straightness. The Contractor shall promptly adjust or replace equipment when test results indicate substandard work.
4. Highway straightedges are recommended for use in lieu of bullfloats for all slab placement and finishing operations.

I. Contractor Responsibility for Concrete Floor Finish Requirements: Floor finish requirements shown below (flatness and levelness tolerances) are minimum requirements that apply unless stricter requirements are contained in instructions for installation of applied floor products in which case the Contractor is responsible for attaining the values prescribed by the manufacturer of such products.

J. Concrete Floor Finish Tolerance for Slab-on-Grade Construction:

1. Concrete Placement: Concrete shall be placed and screeded to predetermined marks set to elevations prescribed on the drawings.
2. Tolerance:
   a. Slabs in nonpublic areas, mechanical rooms, surfaces to received raised computer flooring, surfaces to have thick-set tile or a topping, and parking structures:
      Specified Overall Value - $F_F 20/F_L 15$
      Minimum Local Value - $F_F 15/F_L 10$
   b. Carpeted Areas:
      Specified Overall Value - $F_F 25/F_L 20$
      Minimum Local Value - $F_F 17/F_L 15$
c. Exposed slabs in public spaces, slabs to receive thin-set flooring:
   Specified Overall Value - $F_F^{35}/F_L^{25}$
   Minimum Local Value - $F_F^{24}/F_L^{17}$

d. Ice or Roller rinks:
   Specified Overall Value – $F_F^{45}/F_L^{30}$
   Minimum Local Value – $F_F^{30}/F_L^{24}$

e. Movie or Television studios
   Specified Overall Value – $F_F^{50}/F_L^{50}$
   Minimum Local Value – $F_F^{40}/F_L^{40}$

f. Gymnasium Floors Scheduled to Receive Wood Playing Floor
   Specified Overall Value – $F_F^{50}/F_L^{50}$
   Minimum Local Value - $F_F^{40}/F_L^{40}$

K. Remedial Measures for Slab Finish Construction Not Meeting Specified Tolerances:

1. Application of Remedial Measures. Remedial measures specified herein are required whenever either or both of the following occur:
   a. The composite overall values of $F_F$ or $F_L$ of the entire floor installation measure less than specified values.
   b. Any individual test section measures less than the specified absolute minimum $F_F$ or $F_L$ value.

2. Modification of Existing Surface:
   a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.
   b. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair and time to effect the repair.
   c. Repair method(s), at the sole discretion of the Architect/Engineer or Owner's Representative, may include grinding (floor stoning), planing, retopping with self leveling underlayment compound or repair topping, or any combination of the above.
   d. The Architect/Engineer or Owner's Representative maintains the right to require a test repair section using the approved method of repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect/Engineer or Owner's Representative, the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.
   e. The judgment of the Architect/Engineer or Owner's Representative on the appropriateness of a repair method and its ability to achieve the desired end product shall be final.
   f. All repair work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3. Removal and Replacement:
   a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the
Contractor shall immediately commence to remove and replace the defective work.

b. Replacement section boundaries shall be made to coincide with the test section boundaries as previously defined.

c. Sections requiring replacement shall be removed by sawcutting along the section boundary lines to provide a neat clean joint between new replacement floor and existing floor.

d. The new section shall be reinforced the same as the removed section and doweled into the existing floor as required by the Engineer. No existing removed reinforcing steel may be used. All reinforcing steel shall be new steel.

e. Replacement sections may be retested for compliance at the discretion of the Architect/Engineer or Owner's Representative.

f. The judgment of the Architect/Engineer or Owner's Representative on the need for replacement shall be final.

g. All replacement work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3.17 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete. In hot, dry and windy weather protect concrete from rapid moisture loss exceeding 0.2 lb./sq. ft. x hr before and during finishing operations with an evaporation control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be 7 days for all concrete except high early strength concrete which shall be cured for 3 days minimum.

Alternatively, curing times may be reduced if either of the following provisions is complied with:

a. If tests are made of cylinders kept adjacent to the structure and cured by the same methods, curing measures may be terminated when the average compressive strength has reached 70% of the specified 28 day compressive strength.

b. If the temperature of the concrete is maintained at a minimum of 50°F for the same length of time required for laboratory cured cylinders of the same concrete to reach 85% of the 28 day compressive strength, then curing may be terminated thereafter.

3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period.

B. Curing Formed Surfaces: Where wooden forms are used, 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. When forms are removed, continue curing by one or a combination of the methods specified below, as applicable.

1. Basement Walls, Sides of Exterior Retaining Walls: Moist cure in forms or by one or a combination of methods 1, 2 or 3 specified below. Use a liquid membrane-forming dissipating resin curing compound conforming to ASTM C309, type 1, class A or B for method 3.

C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping and other flat surfaces by one or a combination of the methods specified below, as applicable. The Contractor shall choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Ramps and Horizontal Surfaces of Parking Areas: Cure using only methods 1 or 2 as specified below.

2. Floors Directly Exposed to Vehicular or Foot Traffic not in Parking Areas: Apply two coats of a high-solids, liquid membrane-forming curing and sealing compound conforming to ASTM C1315, type 1, Class A in accordance with method 3 as specified below.

3. Floors that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile or terrazzo or other coating or finishing products: Cure using methods 1, 2 or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C309, type 1, class A or B for method 3.

4. All Other Surfaces: Cure using methods 1,2 or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C309, type 1, class A or B for method 3.

D. Curing Methods

1. Method 1 - Moisture Curing: Provide moisture curing by one of the 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. Method 2 - Moisture-Cover Curing: Provide moisture-cover curing as follows:

   Cover 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 material and waterproof tape.

3. Method 3 - Curing and Sealing Compound: Provide curing/hardener or liquid membrane-forming curing or curing and sealing compound as follows:

CAST-IN-PLACE CONCRETE
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Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Do not allow to puddle. Recoit areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Apply second coat for sealing 2 to 3 hours after the first coat was applied.

Do not use membrane-forming curing and sealing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet), paint or other coatings and finish materials., Dissipating resin type cures are acceptable in these locations.

3.18 HOT WEATHER CONCRETING

A. Definition:

1. Conditions warranting hot weather concreting practices are defined as any combination of high air temperature, low relative humidity and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. If conditions cause an evaporation rate of 0.2 lb./sq. ft./hr. as calculated by Figure 2.1.5 in ACI 305R-99, then precautions shall be taken to prevent plastic shrinkage cracks from occurring.

2. The maximum acceptable concrete temperature at the truck discharge point shall be 95°F.

B. Specification: Hot weather concreting practices specified below shall be followed, all or in part as required, to limit the concrete temperature at the truck discharge point to 95°F or lower.

C. Records: Under hot weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature at truck discharge and general weather conditions.

D. Hot Weather Concreting Requirements: The following items, all or in part as required, shall be followed to limit the concrete temperature to 95°F or lower and to minimize the possibility of plastic shrinkage cracks from developing:

1. Design the concrete mixes specifically for hot weather conditions replacing some cement with fly ash or other pozzolan and using a water reducing retarding admixture (ASTM C 494 Type D).

2. Use the largest size and amount of coarse aggregate compatible with the job.

3. Use sunshades and/or windbreaks.

4. Delay construction of indoor slabs-on-grade until the walls and roof are constructed.

5. Cool and shade aggregate stockpiles.

6. Use ice as part of the mixing water or cool the water with liquid nitrogen.
7. Limit the number of revolutions at mixing speed to 125 maximum.

8. Reduce time between mixing and placing as much as possible.

9. Do not add water to ready-mixed concrete at the job site unless it is part of the amount required initially for the specified water-cement ratio and the specified slump.

10. Schedule concrete placement for early morning, late afternoon, or night.

11. Have all forms, equipment and workers ready to receive and handle concrete.

12. Maintain one standby vibrator for every three vibrators used.

13. Keep all equipment and material cool by spraying with water including exteriors of forms, reinforcing steel, subgrade, chutes, conveyors, pump lines, tremies, and buggies.

14. Protect slab concrete at all stages against undue evaporation by applying a fog spray or mist above the surface or applying a monomolecular film. Where high temperatures and/or placing conditions dictate, use water-reducing retardant admixture (Type D) in lieu of the water-reducing admixture (Type A) as directed by the Owner's Testing Laboratory.

15. Provide continuous curing, preferably with water, during the first 24 hours using wet burlap, cotton mats, continuous spray mist, or by applying a curing compound meeting ASTM C 1315. Continue curing for 3 days minimum.

16. Cover reinforcing steel with water soaked burlap so that steel temperature will not exceed ambient air temperature immediately before placement of concrete.

17. As soon as possible, loosen forms and run water down the inside. When forms are removed, provide a wet cover to newly exposed surfaces.

3.19 COLD WEATHER CONCRETING

A. Definition:

1. Concrete shall not be placed when the outside air temperature is 40°F or less unless cold weather concreting practices are followed as specified below.

2. Cold weather concreting practices should also be followed whenever the following conditions exist for more than three successive days:
   a. the average daily air temperature is less than 40°F, and
   b. the air temperature is not greater than 50°F for more than one half of any 24 hour period.

The average daily air temperature is the average of the highest and lowest temperature occurring during the period from midnight to midnight.
3. The temperature of concrete mixed and delivered to the job site shall conform to the following requirements:

<table>
<thead>
<tr>
<th>Air Temperature</th>
<th>Min. Concrete Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 30°F</td>
<td>60°F</td>
</tr>
<tr>
<td>0°F to 30°F</td>
<td>65°F</td>
</tr>
<tr>
<td>Below 0°F</td>
<td>70°F</td>
</tr>
</tbody>
</table>

4. The minimum temperature of concrete during placement and curing shall be 55°F.

5. The maximum concrete temperature heated by artificial means at point of placement shall not exceed 90°F.

B. Records: Under cold weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature as placed and general weather conditions.

C. Cold Weather Concreting Requirements: The following items, all or in part as required, should be followed to assure acceptable concrete in cold weather conditions:

1. Design the concrete mix suitable for cold weather. Use air entrainment (where not prohibited) and obtain high early strength by using a higher cement content, a high early strength cement (Type III), or a specified non-chloride accelerator (ASTM C 494 Type C or E).

2. Protect the concrete during curing period using insulating blankets, insulated forms, enclosures and/or heaters.

3. Concrete cured in heated enclosures shall have heaters vented to prevent exposure of concrete and workmen to noxious gases.

4. Frozen subgrade shall be thawed prior to concrete placement and snow and ice shall be removed from forms.

5. Concrete shall be protected and cured at 50°F for seven days minimum if normal concrete (Type I cement) is used and for three days minimum if high early strength concrete (concrete with Type III cement, 100 pounds cement added per cubic yard concrete, or a non-chloride accelerator added).

6. Concrete not loaded during construction shall be protected a minimum of 3 days for normal concrete and 2 days for high early strength concrete to obtain safe form stripping strength. Concrete fully loaded during construction shall be protected for whatever time period is required to obtain the required strength as determined by nondestructive strength tests (Windsor probe, Swiss Hammer Test) on the in-place concrete.

7. Heat the mixing water and then blend hot and cold water to obtain concrete no more than 10°F above the required temperature.

8. Heat the aggregates by circulating steam in pipes placed in the storage bins for air temperatures consistently below 32°F. When either water or aggregate is heated to over 140°F combine them in the mixer first to obtain a maximum
temperature of the mixture not to exceed 140°F in order to prevent flash set of
the concrete.

9. Uniformly thaw aggregates far in advance of batching to prevent moisture
variations in the stockpile.

10. Cover warmed stockpiles with tarps to retain heat.

11. Place air entraining admixture in the batch after the water temperature has been
reduced by mixing with cooler solid materials.

12. Use wind screens to protect concrete from rapid cooling.

13. Place vertical pump lines inside the building, if possible, for concrete being
pumped.

14. Maintain artificial heat as low as possible to reduce temperature stresses during
cooling.

15. Avoid water curing of concrete except for parking garage structures. Apply the
required curing compound to unformed surfaces as soon as possible to prevent
drying of concrete from heated enclosures.

16. Delay form stripping as long as possible to help prevent drying from heated
enclosures and to reduce damage to formed surfaces caused by premature
stripping.

17. Provide triple thickness of insulating materials at corners and edges vulnerable to
freezing.

18. Wrap protruding reinforcing bars with insulation to avoid heat drain from the warm
concrete.

19. Gradually reduce the heat at the end of the heating period to reduce likelihood of
thermal shock.

3.20 PLACEMENT OF WELDED WIRE FABRIC

A. Wherever welded wire fabric is specified as reinforcement in slabs, it shall be continuous
and properly lapped one full wire spacing plus 2" across the entire concrete surface and
not interrupted by beam or girders.

3.21 PLACEMENT OF COLUMN DOWELS AND ANCHOR BOLTS

A. Dowels for columns, plinths, and pilasters and anchor bolts shall be accurately set using
1/8" thick steel templates.

3.22 REINFORCEMENT IN GRADE BEAMS

A. Unscheduled Grade Beam Reinforcement: Unless shown otherwise on the drawings, all
unscheduled grade beams shall be reinforced at a minimum with 2-#5 continuous top and
bottom bars and #3 closed stirrups at 10" on center. Continuous top bars shall be lapped
at midspan between supports with a class A tension lap. Continuous bottom bars shall lap 12" over supports.

B. Dowels to Slab: Unless shown otherwise on the drawings, provide minimum #3 dowels x 2'-0" at 30" on center (90° bent bar, 1'-0" each side) from all grade beams to slabs.

C. Corner Bars: Unless shown otherwise on the drawings, provide 1-#6 x 4'-0" (90° bent bar, 2'-0" each side) top and bottom in exterior face of grade beams at exterior corners.

D. Discontinuous Top and Bottom Bars: Where a discontinuous grade beam intersects a continuous grade beam, the top bars of the discontinuous beam shall terminate into the continuous beam with a 90° hook. The bottom bars shall extend a minimum of 6" beyond the face of the continuous beam.

E. Bar Support for Grade Beam Cages: Grade beam bottom steel shall be supported at 5'-0" maximum centers using beam bolsters that provide 3" bottom cover to the reinforcing steel. Beam bolsters used shall be designed and manufactured for support on soil.

F. Reinforcement around Sleeves through Grade Beams: Unless detailed otherwise on the drawings, provide not less than 2-#5 x (opening width + 4'-0") (2'-0" each side of opening) above and below opening with 2 additional stirrups each side of opening.

3.23 REINFORCEMENT IN HOUSEKEEPING PADS

A. Provide welded smooth wire fabric 6 x 6 W2.9 x W2.9 minimum in all housekeeping pads supporting mechanical equipment unless detailed otherwise on the drawings.

3.24 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as 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. Set anchor bolts for machines 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. Installation of Adhesive Anchors Using Injectable Epoxy or Adhesive: A representative of the adhesive manufacturer shall be present for the first three holes that are drilled and filled with adhesive. After drilling the hole to the diameter and depth recommended by the manufacturer, clean the hole with a wire or nylon brush. Blow the dust out of the hole using compressed air with a nozzle that reaches to the bottom of the hole. When using
adhesive from a new pack, the adhesive that is discharged from the mixing nozzle should be a uniform gray color before any adhesive is installed in the hole. Fill the hole with adhesive starting from the very bottom of the hole until the hole is about 2/3 full. Do not leave an air pocket at the bottom of the hole. Insert the anchor rod or dowel by slowly twisting it into the hole.

3.25 CONCRETE SURFACE REPAIRS

A. Definition - Defective Areas:

1. Formed Surfaces: Concrete surfaces requiring repairs shall include all honeycombs, rock pockets and voids exceeding 1/4" in any dimension, holes left by tie rods or bolts, cracks in excess of 0.01" and any other defects that affect the durability or structural integrity of the concrete.

2. Unformed Surfaces: Concrete surfaces requiring repair shall include all surface defects such as crazing, cracks in excess of 0.01" wide or cracks which penetrate to reinforcement or through the member, popouts, spalling and honeycombs.

B. Classification:

1. Structural Concrete Repair: Major defective areas in concrete members that are load carrying (such as shear walls, beams, joists and slabs), are highly stressed, and are vital to the structural integrity of the structure shall require structural repairs. Structural concrete repairs shall be made using a two part epoxy bonder, epoxy mortar or specified polymer repair mortar. Location of structural concrete repairs shall be determined by the Engineer.

2. Cosmetic Concrete Repair: Defective areas in concrete members that are non-load carrying and minor defective areas in load carrying concrete members shall require cosmetic concrete repair when exposed to view and not covered up by architectural finishes. Cosmetic concrete repairs may be made using a polymer repair mortar and compatible bonding agent. The location of cosmetic concrete repair required shall be determined by the Architect/Engineer. Stains and other discolorations that cannot be removed by cleaning and are exposed to view will require cosmetic repair. Cosmetic concrete repair in exposed-to-view surfaces will require Architect's approval prior to patching operation.

3. Slab Repairs: High and low areas in concrete slabs shall be repaired by removing and replacing defective slab areas unless an alternate method, such as grinding and/or filling with self-leveling underlayment compound or repair mortar is approved by the Architect/Engineer. Repair of slab spalls and other surface defects shall be made using epoxy products as specified above and as determined by the Engineer. The high strength flowing repair mortar may be used for areas greater than 1 inch in depth.

3.26 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. See Testing Laboratory Services section of these Specifications for concrete materials and cast-in-place concrete inspection and test requirements.

3.27 INVESTIGATION OF LOW CONCRETE STRENGTH TEST RESULTS
A. Contractor Responsibility for Low Strength Concrete

1. If the average of any three consecutive strength tests falls below the required f’c for a class of concrete but no individual strength test is more than 500 psi below f’c, the Contractor shall immediately notify the Engineer by telephone or e-mail and take immediate steps to increase the average of subsequent strength tests.

2. If any individual strength test falls more than 500 psi below the required f’c, the Contractor shall immediately notify the Engineer by telephone or e-mail and take immediate steps to assure that the load-carrying capacity of the structure is not jeopardized.

B. Additional Field Tests to Confirm Low Concrete Strengths

1. The cost of all investigations of low-strength concrete, as defined by any individual strength test being more than 500 psi below the required f’c, shall be borne by the Contractor.

2. Code-Prescribed Acceptance: The only accepted field-test methods of determining actual in-situ concrete strength is by the way of core tests as prescribed by ACI 318.

3. Non-Destructive Tests: If any individual strength test falls more than 500 psi below the required f’c, the Engineer may request that non-destructive field tests be performed on the concrete in question using Swiss Hammer, Windsor Probe, or other appropriate methods as approved by the Engineer. Report the comparative test results of the suspect concrete under consideration with identical tests done on concrete of known strength and of the same class. The Engineer considers these test results as only approximate indicators of strength and may not necessarily, by themselves, resolve the low concrete strength issue. These test results will be considered as additional information by which to make an informed judgment. The Engineer reserves the right to accept the concrete based on the results of these approximate tests or order that core tests be taken as prescribed below. At the Contractor’s option, the approximate non-destructive field-tests may be waived and core tests immediately initiated.

4. Core Tests: If, in the opinion of the Engineer, the likelihood of low-strength concrete is confirmed and it has been determined that the load-carrying capacity of the structure is significantly reduced as a result, the Engineer may request that core tests be taken from the area in question as directed by the Engineer. There shall be a minimum of three cores taken for each strength test more than 500 psi below the required f’c in accordance with ASTM C42. If concrete in the structure will be dry under service conditions, cores shall be air dried (temperature 60° to 80°F, relative humidity less than 60 percent) for 7 days before test and shall be tested dry. If concrete in the structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 40 hours and tested wet. The Contractor shall fill all holes made by drilling cores with an approved drypack concrete.

5. Acceptance Criteria for Core Test: Concrete in an area represented by core tests shall be considered adequate if the average of three cores is equal to at least 85% of the required f’c and no single core is less than 75% of the required f’c. If
approved by the Engineer, locations of erratic core strengths may be retested to check testing accuracy.

6. Load Test: If the concrete strength is not considered adequate based on core tests and the structural adequacy remains in doubt, the Engineer may order a load test as specified in ACI 318 be conducted for the questionable portion of the structure.

7. Strengthening of the Structure or Demolition: If the structural adequacy of the affected portion of the structure remains in doubt following the load test, the Engineer may order the structure to be strengthened by an appropriate means or demolished and rebuilt at the Contractor's expense.

END OF SECTION 03 30 00
SECTION 04 21 13
BRICK MASONRY

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. Face brick.
   2. Mortar and grout.
   3. Ties and anchors.
   4. Miscellaneous masonry accessories.
B. Related Sections:
   1. Section 014500 "Windstorm Construction Requirements."
   2. Section 047200 "Cast Stone Masonry" for furnishing cast stone trim.
   3. Section 055000 "Metal Fabrications" for furnishing steel lintels and shelf angles for brick masonry.
   4. Section 076200 "Sheet Metal flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Samples for Verification: For each type and color of the following:
   1. Face brick, in the form of straps of five or more bricks.
   2. Special brick shapes.
   3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
   5. Accessories embedded in masonry.
1.4 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers’ product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type and size of the following:

1. Masonry units.
   a. Include data on material properties.
   b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
   c. For exposed brick, include test report for efflorescence according to ASTM C 67.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Anchors, ties, and metal accessories.

C. Brick Expansion Joint Locations: Provide submittal locating all masonry expansion joints per American Brick Institute recommendations for approval by Architect. Do not start installation of masonry veneer without an approved shop drawing.

1.5 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of typical wall area as shown on Drawings. Mock-up size shall be minimum of 4’- 6” wide by 5’-6” high.
   a. Include a sealant-filled joint at least 16 inches long in mockup.
   b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
   c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
   d. Include metal studs, sheathing, building moisture & vapor barrier, sheathing joint-and-penetration treatment, veneer anchors, flashing, and weep holes in mockup.
2. Clean exposed faces of mockups with masonry cleaner as indicated.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
   a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

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

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

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 spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
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.


**PART 2 - PRODUCTS**

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216.
1. Products: Subject to compliance with requirements, provide the following:
   a. Acme Brick Company
      1) Field Color: DTP blend 138 Royal Birkdale
      2) Accent Color: PEP blend 31 Ridgemar

2. Grade: SW.
3. Type: FBS.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
8. Special Shapes: Provide special sill shape as shown on drawings.
9. Application: Use where brick is exposed unless otherwise indicated.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

   1. Products: Subject to compliance with requirements, provide the following:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

E. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

   1. Colored Portland Cement-Lime Mix:
      a. Products: Subject to compliance with requirements, provide the following:
F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.
2. Stainless-Steel Sheet: ASTM A 666, Type 316.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

   a. Structural Performance Characteristics: Capable of withstanding load in both tension and compression without deforming or developing play in excess of 0.05 inch. See Section 014500 of specifications for additional requirements regarding Windstorm Construction requirements. Provide documentation as part of submittal package to show compliance with all Windstorm requirements.

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

   a. Products: Subject to compliance with requirements, provide the following:

      1) Hohmann & Barnard: “DW-10HS” veneer anchor screw on plates with VBT triangular ties, stainless-steel.

      2) Windstorm: Anchoring, anchors, and spacing shall be sized and determined as required to meet Windstorm requirements. See Section 014500 of these specifications for additional information.
3. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer. Screw size and length to be determined based upon Windstorm Construction Requirements. See Section 014500 for additional information.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Weep/Vent Products: Use one of the following unless otherwise indicated:
   
   1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.

C. Cavity Drainage Material: Use one of the following unless otherwise indicated:
   
   1. MortarNet Solutions - MortarMet® with Insect Barrier.
   2. Hohmann & Barnard, Inc. – Mortar Trap.
   3. Advanced Building Products, Inc. – Mortar-Break DT.

2.6 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      
      a. Sure Klean 600, by PROSOCO, Inc.
      b. Tex Clean, by AHI Supply.

2.7 MORTAR 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.
   2. Use portland cement-lime mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.

D. Pigmented Mortar: Use colored cement product.
   1. Pigments shall not exceed 10 percent of portland cement by weight.
   2. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Face brick/ Thin Veneer.
      b. Cast stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
   1. Mix to match Architect's sample.
   2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
      a. Face brick/ Thin Veneer.
      b. Cast stone trim units.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.
D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. [Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
3. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.
3.4 LAYING MASONRY WALLS

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

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond or one-third running bond pattern indicated on Drawings and confirmed with Architect; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

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

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:

1. Embed triangular ties in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as required to meet Windstorm Construction Requirements. Install additional anchors within 12 inches of openings and at intervals, not exceeding 16 inches, around perimeter.

3.7 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:
   1. Build in compressible joint fillers where indicated.
   2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

   1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install hot dipped galvanized steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install flashing as follows unless otherwise indicated:

   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 12 inches; with upper edge tucked under building air barrier or building wrap, lapping at least 4 inches.

3. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

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

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
   1. Use specified weep/vent products to form weep holes.
   2. Space weep holes 24 inches o.c. unless otherwise indicated.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

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, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. 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. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 04 21 13
SECTION 04 22 00
CONCRETE UNIT MASONRY

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. Decorative Concrete Masonry Units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   4. Masonry joint reinforcement.
   5. Miscellaneous masonry accessories.

B. Related Sections:
   1. Section 014500 "Windstorm Construction Requirements" for exterior CMU wall design requirements & windloads.
   2. Section 047200 "Cast Stone Masonry" for furnishing cast stone trim.

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

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

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.

B. Samples for Initial Selection:
   1. Decorative CMU’s, in form of small-scale units.
   2. Colored mortar.
   3. Weep holes/vents.
1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:
   1. Cementitious materials. Include brand, type, and name of manufacturer.
   2. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   3. Grout mixes. Include description of type and proportions of ingredients.
   4. Reinforcing bars.
   5. Joint reinforcement.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.6 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
   1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches.
   2. Protect approved sample panels from the elements with weather-resistant membrane.
   3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
      a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
1.7 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 use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 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.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.


PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise noted.
   1. Provide special shapes for corners, jambs, movement joints, bonding, and other special conditions.
   2. Provide square-edged units for outside corners unless otherwise indicated.

B. Decorative CMU's: ASTM C 90.
   1. Density Classification: Normal Weight.
   2. Size (Width): Manufactured to dimensions specified in “CMU” Paragraph.
   3. Pattern and Texture:
      a. Scored vertically so units in running bond appear as square units laid in stacked bond, standard finish.
   4. Color: As selected by Architect from manufacturer’s full range.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

   1. Colored Portland Cement-Lime Mix:
a. **Products:** Subject to compliance with requirements, provide one of the following:


2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.

E. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

F. Aggregate for Grout: ASTM C 404.

G. Water: Potable.

2.4 **REINFORCEMENT**

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
   1. **Exterior Walls:** Hot-dip galvanized, carbon steel.
   2. Wire Size for Side Rods: 0.187-inch diameter.
   4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
   5. Provide in lengths of not less than 10 feet, with prefabricated corners.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 **MISCELLANEOUS MASONRY ACCESSORIES**

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.6 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime mortar unless otherwise indicated.
   3. For exterior masonry, use portland cement-lime mortar.
   4. For reinforced masonry, use portland cement-lime mortar.
   5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
   1. For reinforced masonry, use Type S.

D. 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 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

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

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

D. All exterior masonry walls shall be placed to meet Windstorm Construction Requirements as noted in Section 014500 and in Construction documents.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2.
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

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: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch 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. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.

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

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, and other special conditions.
3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.8 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

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

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 60 inches.

3.9 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
B. Inspections: Level 1 special inspections according to the "International Building Code."
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 500 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

3.10 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

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, where indicated.

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

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

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. 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. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
SECTION 04 72 00
CAST STONE MASONRY

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. Cast stone trim including the following:
      a. Wall caps.
   B. Related Sections:
      1. Section 014500 “Windstorm Construction Requirements” for design load requirements.
      2. Section 042000 "Unit Masonry" for installing cast stone units in unit masonry.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
   1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
   1. Include wall elevations showing layout of units and locations of joints and anchors.
C. Samples for Verification:
   1. For each color and texture of cast stone required, 10 inches square in size.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to
manufacture required units, and is a plant certified by the Cast Stone Institute. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

B. Mockups: Furnish cast stone for installation in mockups specified in Section 042000 "Unit Masonry."

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects.
   1. Build 48 inches long mockup of typical screening wall area as shown on Drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.
   1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
   2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

1.6 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 CAST STONE UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include.

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.

F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

G. Colors and Textures: As selected by Architect from manufacturer's full range.

2.2 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 042000 "Unit Masonry."

2.3 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

2.4 MORTAR MIXES

A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."

3.3 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

END OF SECTION 04 72 00
SECTION 04 73 00

SIMULATED STONE VENEER

PART 1  GENERAL

1.1 SUMMARY

A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
   1. Simulated stone veneers for exterior applications.
   2. Reinforcement, anchorages, mortar, and accessories.

C. Related Sections:
   1. Section 01 45 00 – Windstorm Construction Requirements
   2. Section 05 04 00 – Cold Formed Metal Framing: Wall framing
   3. Section 06 10 53 – Rough Carpentry: Wall framing
   4. Section 07 92 00 – Joint Sealants: Sealant joints
   5. Section 07 24 00 – Exterior Insulation and Finish System: Synthetic plaster finish
   6. Section 09 24 00 – Portland Cement Plaster: Cement plaster finish

1.2  SUBMITTALS

A. Submit following in accordance with Section 01 33 00.
   1. Product Data: Submit for fabricated wire reinforcement and each type of stone specified. Include all applicable physical and performance data.
   2. Samples: Submit (1) 3 feet x 4 feet samples of simulated stone units to illustrate color, texture, and size range of each type unit.
   3. Manufacturer’s detailed installation instructions.
   4. Certifications listed in Quality Assurance article of Part 1 this Section.

1.3 FIELD SAMPLES

A. General: Comply with Section 01 40 00.

B. Sample Installation: Construct stone wall at job site 3 feet x 4 feet in size, including mortar, special shapes, bonding, joint work, reinforcement, moisture barrier, grouting, corbelling, mortar color, expansion, control joints, and accessories.
   1. Obtain Architect’s approval before beginning work. Protect and retain sample as a basis on which the quality of the work will be judged. Do not remove until Substantial Completion.
   2. Accepted Field Sample: May not remain as part of completed Work.

1.4 QUALITY ASSURANCE

A. Installer: Minimum 5 years experience in similar types of work of similar SIMULATED STONE VENEER
   04 73 00 - 1
scope and be able to furnish list of previous jobs and references if requested by Architect.

B. Fabricator: Licensee of manufacturer with not less than 5 years experience manufacturing simulated stone products of size, type, and quantity as required for this project.

C. Expansion Joints: Provide expansion joints as indicated on Drawings or, if not indicated, install at frequency and in accordance with details and as recommended by manufacturer. Confirm locations and frequency with Architect before beginning work.

D. Certifications:
   1. Provide written documentation that products have met or exceeded at least one of the following certifications for a minimum of 10 years:
      a. ICBO – International Conference of Building Officials;
      b. SBCCI – Southern Building Code Congress International;
      c. BOCA – Building Officials and Code Administrators International; or
   2. Provide written documentation that stone products comply with specified minimum criteria when tested in accordance with testing standards specified in Part 2 of this Section.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Minimum air temperature of 40 degrees F (4 degrees C) prior to, during, and for 48 hours after completion of work; and

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect materials in accordance with Section 01 60 00.
   1. Store mortar materials on pallets in dry place.
   2. Protect materials from rain, moisture, and freezing temperatures.
   3. Protect reinforcement and accessories from elements.

1.7 WARRANTY

A. Special Warranty: Prepare and submit in accordance with Section 01 78 00.
   1. Provides 50-year limited warranty against manufacturing defects in manufactured stone products.

PART 2 PRODUCTS

SIMULATED STONE VENEER
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2.1 MANUFACTURERS
A. Manufacturer: Coronado Stone Products.
B. Stone Product: Subject to compliance with requirements, provide the following product:
   1. **The Classic Series** oversized tiles, 12 inches by 24 inches, as manufactured by Coronado Stone Products
      a. Color: As selected by Architect from full range of colors.

2.2 STONE MATERIALS
A. Simulated Stone:
   1. Precast simulated stone, composed of following materials:
      a. Portland Cement: ASTM C 150, Type 1, 2, or 3 depending upon color to be produced.
      b. Course Aggregates: ASTM C 330, lightweight type, color as necessary to obtain final approved color of stone.
      c. Sand: ASTM C 144, special color if required to match approved sample.
      d. Iron oxide colors.
      e. Water: Clean and free from deleterious substances.
   B. Stone Accessories
      1. Provide accessory stones as required for complete project.

2.3 MORTAR MATERIALS
A. Pigments: Meeting ASTM C 979, mineral oxide type.
   1. Mortar Color: As selected from full line of colors manufactured by Coronado Stone Products
B. Bonding Agent: As recommended by simulated stone manufacturer for direct bonding of simulated stone to masonry or concrete substrates when not using metal lath.
C. Water: Potable.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION
A. Examination: Examine conditions and proceed with work in accordance with Section 01 40 00.
   1. Verify that field conditions are acceptable and are ready to receive work.
   2. Verify items provided by other Sections of work are properly sized and located.
   3. Verify that built-in items are in proper location and ready for roughing into masonry work.
   4. Verify correct product prior to installation.

SIMULATED STONE VENEER
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5. Verify that masonry and concrete substrates do not have residual coatings (paint, bond breaker, curing compounds, etc.) present, which may affect bonding of mortar to substrate.
   a. Install metal lath if residual coatings are present on substrate.

6. Consult Owner and manufacturer if deficiencies exist. Correct deficiencies in accordance with stone manufacturer’s recommendations.

B. Protect surrounding area from possible damage during installation work.

C. Initiating installation constitutes Installer’s acceptance of existing surfaces and substrate.

3.2 APPLICATION

A. Simulated Stone Veneer: Install in accordance with manufacturer’s instructions.
   1. Country Rubble: Stone should be installed in a horizontal ashlar pattern with grouted joints. Do not install stones vertically or dry stacked. Blend the stone on the wall from several different boxes to ensure proper color and size variation.
   2. Apply 3/8 to 1/2 inch of mortar covering to back of each stone.
   3. Grout joints shall be 1/2 to 5/8 inch in width.

B. Remove excess mortar; do not allow mortar to dry on face of units.
   1. Point and tools joints before mortar has set.
   2. Clean and finish joints in accordance with architect’s and manufacturer’s instructions.

C. Control Joints: Size in accordance with Section 07 92 00 for sealant performance, but in no case larger than adjacent mortar joints in exposed stone units.

D. Expansion Joints: Provide where indicated on Drawings or as recommended by system manufacturer.

E. Built-in Work: As work progresses, build in door and window frames, nailing strips, anchor bolts, plates, and other items specified in various sections.
   1. Build in items plumb and level.
   2. Bed anchors of metal door and glazed frames in mortar joints. Fill voids solid with mortar.
   3. Do not build in organic materials subject to deterioration.

F. Installation of simulated stone shall be installed to meet windstorm requirements as noted in section 01 45 00 of these specifications. Provide in submittal review, required anchors and spacing for securing stone to wall that meets windstorm requirements. Anchorage system must be approved by structural engineer prior to starting installation.

3.3 ADJUSTING

A. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other sections of work to provide correct size, shape, and location.
   1. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

      SIMULATED STONE VENEER
      04 73 00 - 4
3.4 CLEANING AND SEALING

A. Cleaning: Comply with Section 1 of specifications.
   1. Remove excess mortar and smears using brush or steel wool.
   2. Replace defective mortar. Match adjacent work.
   3. Clean soiled surfaces with non-acidic solution, acceptable to the stone manufacturer, which will not harm masonry or adjacent materials.
   4. Leave surfaces thoroughly clean and free of mortar and other soiling.
   5. Use nonmetallic tools in cleaning operations.

B. Sealer: Apply sealer to completed surface in accordance with manufacturer’s instructions.

END OF SECTION 04 73 00
SECTION 05 04 00
COLDFORMED METAL FRAMING

PART 1 - GENERAL

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

1.2 DESCRIPTION OF WORK
A. Extent of coldformed metal framing used as structural support for exterior cladding and/or used as loadbearing support for any roof areas is shown on the drawings.
B. Types of coldformed metal framing units include the following:
   1. Non-load bearing studs.

1.3 QUALITY ASSURANCE
A. Component Design: Compute structural properties of studs and joists in accordance with "Specification for Design of Cold-Formed Steel Structural Members" latest edition, as published by the American Iron & Steel Institute (AISI).
B. Codes and Standards:
C. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units which have been approved by governing authorities having jurisdiction.

1.4 SUBMITTALS
A. Section 01 33 00 – Submittal Procedures: Submittal Requirements.
B. Manufacturer’s certification of recycled content per division 1.
C. Manufacturer’s certification regarding the use of regional materials per division 1
D. Product Data: Submit manufacturer's product information and installation instructions for each item of coldformed framing and accessories.
E. Shop Drawings: Submit shop drawings for all coldformed metal framing used to support exterior cladding. Shop drawings shall indicate placing of all framing members showing type, size, gauge, number, location and spacing. They shall also indicate supplemental strapping, bracing, splices, bridging, accessories and details required for proper installation. Shop drawings must indicate type of fastening system used along with size and number of fasteners.
1. Screwed connections shall show type, size, and number of screws for all connections. Submit manufacturer’s data giving strength values for screws used.

1.5 DELIVERY AND STORAGE
A. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS
A. With each type of metal framing indicated on the Structural Drawings, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners and accessories as recommended by the manufacturer for applications indicated, as needed to provide a complete metal framing system.

2.2 GRADES OF STEEL
A. For 18-gauge and lighter units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 33,000 psi and conform to ASTM A 446 and/or A 570.
B. For 16 gauge and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi.

2.3 FINISH
A. Provide galvanized finish to all metal framing components complying with ASTM A 525 for minimum G60 coating.

2.4 TYPES
A. Cee "C"-Shape Loadbearing and Exterior Cladding Studs: Manufacturer's standard load-bearing steel studs of size, shape, and gage indicated, with 1.625" flange and flange return lip.
Subject to compliance with requirements, manufacturers offering Cee "C"-shaped, load-bearing steel studs which may be incorporated in the work include, but are not limited to, the following:
1. ClarkDietrich Building Systems
2. MarinoWare

B. Joists: Manufacturer's standard Cee "C"-shape sections of size, shape, and gage indicated on the drawings.
Subject to compliance with requirements, manufacturers offering Cee "C"-shaped steel joists which may be incorporated in the work include, but are not limited to, the following:
1. ClarkDietrich Building Systems
2. **MarinO\Ware**

### 2.5 FABRICATION

A. **General:** Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.

B. **Connections:**

1. **Type:** Connection of coldformed metal components shall be
   
   a. welded or screwed as shown on the drawings.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Request inspections of connections.

#### 3.2 INSPECTION AND PREPARATION

A. Pre-Installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

#### 3.3 INSTALLATION

A. **Manufacturer's Instructions:** Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.

B. **Runner Tracks:** Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks per structural drawings for type of construction involved, except do not exceed 16" o.c. spacing for nail or powder-driven fasteners, or 16" o.c. for other types of attachment. Abutting pieces of track shall be securely spliced together. Provide fasteners at corners and ends of tracks.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements. Splices in axially loaded and non-loaded bearing exterior cladding stud systems shall not be permitted.

D. Provide four (4) studs at each intersecting wall and three (3) studs at each corner. See details on the drawings.

E. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.

F. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
G. Installation of Wall Stud System: Studs shall be seated firmly against the track webs allowing load transfer by direct bearing without complete dependence on the connection to the track. Connect studs to top and bottom runner tracks by either welding or screw fastening as indicated on the drawings at both inside and outside flanges.

H. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

I. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.

J. Horizontal Bridging:
   1. Install horizontal bridging in all non-loadbearing exterior cladding stud systems, spaced (vertical distance) at not more than 4'-0" o.c. Weld at each intersection.
   2. Install horizontal bridging in all loadbearing stud systems spaced (vertical distance) at not more than 3'-4" o.c. Provide positive screwed connection at each stud intersection.
   3. Provide stud bracing during construction as required for studs to carry construction loads.

K. Sheathing Attachment: Provide attachment of interior and exterior sheathing and wall material to each stud in accordance with Section 5 (Bracing Requirements) of the AISI Specification.

L. Wall Braces: Provide wall braces ("kickers") as shown on the Architectural and Structural Drawings, but not less in size and gage than that of wall stud being braced and not spaced greater than every fourth stud, and first stud from all corners, whether shown on the drawings or not. Provide connection at each end of brace to develop strength of brace. Connections to concrete shall be made with power-driven fasteners or expansion bolts having approval by the International Conference of Building Officials (ICBO) and shall be in strict accordance with manufacturers instructions and only if intended for coldformed metal attachment. Connections to coldformed metal and structural steel shall be as specified in section on Connections.

M. Field Painting: Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.

END OF SECTION 05 04 00
SECTION 05 12 00

STRUCTURAL STEEL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 STANDARDS

A. The following Standards are listed in this specification:

- ASTM A6: Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, Sheet Piling
- ASTM A36: Standard Specification for Carbon Structural Steel
- ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- ASTM A370: Standard Test Methods and Definitions for Mechanical Testing of Steel Products
- ASTM A449: Standard Specification for Quenched and Tempered Steel Bolts and Studs
- ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- ASTM A572: Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel
- ASTM A780: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- ASTM A992: Standard Specification for Steel for Structural Shapes for Use in Building Framing
- ASTM C1107: Standard specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
- ASTM F436: Standard Specification for Hardened Steel Washers
- ASTM F959: Standard Specification for Compressible Washer-Type Direct Tension Indicators for use with Structural Fasteners
- ASTM F1554: Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- ASTM F1852: Standard Specification for “Twist-Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- ASCE 7-98: Minimum Design Loads for Buildings and Other Structures
1.3 DESCRIPTION OF WORK

A. This section includes structural steel members which meet specified criteria for the use of post-industrial recycled steel and regional materials.

B. Extent of structural steel work is shown on drawings including schedules, notes and details that show size and location of members, typical connections, and type of steel required. Furnish all labor, materials, services, equipment and appliances required in conjunction with or related to the furnishing, fabrication, delivery, and erection of all structural steel defined below. Include all supplementary parts, members and connections necessary to complete the structural steel work, regardless of whether all such items are specifically shown or specified on the drawings.

C. Structural steel shall be defined as that work prescribed in Section 2.1 of the AISC Code of Standard Practice and the following items: all steel supports for elevator guide rails, and catwalks (including support members and attached structural steel shapes and plates such as hangers).

D. Miscellaneous metal fabrications, architecturally exposed structural steel, metal stairs and ladders, steel joists and joist girders, cold-formed metal framing, and metal deck are specified elsewhere in these Specifications.

1.4 QUALIFICATIONS

A. Fabricator: The structural steel fabricator shall have not less than 5 years experience in the successful fabrication of structural steel similar to this project.

The structural steel fabricator must participate in the AISC Quality Certification Program and be designated an AISC Certified Plant in Category Sbd, Conventional Steel Building Structures.

B. Erector: The structural steel erector shall have not less than 2 years successful experience in the erection of structural steel of a similar nature to this project.

1.5 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated. Certain sections in this specification contain requirements that are more restrictive and/or different than contained in the standards listed. In such cases, the requirements of this specification shall control.

1. All federal (OSHA), state and local laws that govern safety requirements for steel erection and other requirements if more stringent than the codes and standards enumerated below. OSHA requirements include regulation 29 CFR 1926, Part R, "Safety Standard for Steel Erection".


5. ANSI/AWS D1.1 "Structural Welding Code - Steel".


B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code - Steel". All welding shall be performed in accordance with a written Welding Procedure Specification (WPS) as required in ANSI/AWS D1.1 that is approved by the Engineer.

C. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in the mill, shop, and field by the Owner's testing laboratory. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. The Contractor shall promptly remove and replace materials or fabricated components that do not comply.

D. Question about Contract Documents: The Contractor shall promptly notify the Architect/Engineer whenever design of members and connections for any portion of the structure are not clearly indicated or when other questions exist about the Contract Documents. Such questions shall be resolved prior to the submission of shop drawings.

E. Testing Laboratory Services: See Testing Laboratory Services section of these Specifications for requirements relating to structural steel.

Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.

1.6 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Submittal requirements..

B. Manufacturer’s certification of recycled content per division 1.

C. Manufacturer’s certification regarding the use of regional materials per division 1

D. Product Data: Submit producer's or manufacturer’s specifications and installation instructions for following products; include laboratory test reports and other data to show compliance with specifications (including the specified standards):

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

2. High-strength bolts (each type), including nuts and washers, including certified copies of mill reports covering chemical and physical properties.

3. Shrinkage-resistant grout.

4. Unfinished bolts and nuts.
5. Welding electrodes (each type).

6. Structural steel primer paint.

7. Inorganic or other protective paint.

8. Shear studs.

9. Direct tension indicators.

E. Shop Drawings:

1. General Requirements: Submit shop drawings prepared under the supervision of and sealed by, for connection design only, a professional engineer licensed in the state where the project is located detailing fabrication of structural steel components. Structural steel shop drawings shall include the following minimum information:
   
a. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections).
   b. Provide setting drawings, templates, and directions for installation of anchor rods and other anchorages to be installed by others.

2. All fabricated material and connections shall fit within architectural constraints.

3. The omission from the shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though the shop drawings may have been reviewed and approved.

F. Test Reports: Submit copies of reports of tests conducted on all material and on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results. See Testing Laboratory Services section of these Specifications for additional requirements.

G. Manufacturer’s certification of recycled content per division 1.

H. Manufacturer’s certification regarding the use of regional materials per division 1.

I. Qualification Data:

1. Submit qualification data for firms and persons specified in Article 1.03 “Qualifications” 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.
2. Submit Welding Procedure Specifications (WPS) in accordance with ANSI/AWS D1.1 for all welded joints. Submit test reports showing successful passage of qualification tests for all non-prequalified WPSs.

3. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests as specified in section 1.05-B. If recertification of welders is required, retesting will be at Contractor's responsibility.

J. Substitutions:

1. Substitutions for the member sizes, type(s) of steel connection details or any other modifications proposed by the Contractor will be considered by the Architect/Engineer only under the following conditions:

   a. That the request has been made and accepted prior to the submission of shop drawings. All substitutions shall be clearly marked and indicated on the shop drawings as a substitute.

   b. That there is a substantial cost advantage or time advantage to the Owner; or that the proposed revision is necessary to obtain the required materials or methods at the proper times to accomplish the work in the time scheduled.

   c. That sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by the Architect/Engineer, including cost reductions or savings in time to complete the work.

   d. In no case shall such revisions result in additional cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

B. Furnish all fuel, maintenance, and equipment required for hoisting and placement of materials under this contract.

C. Process, pay for and maintain all permits and certificates of on-site inspection required for derricks, cranes and hoisting equipment. No derrick, crane or hoisting equipment shall be operated without a certificate of operation and a certificate of on-site inspection, as required by governing authorities.

1. In addition to the above, all hoisting equipment shall be installed, operated and maintained in accordance with all applicable regulations of authorities having jurisdiction.

2. The Contractor shall furnish street storage and sidewalk crossing permits.

1.8 JOB CONDITIONS

A. The Contractor shall coordinate the fabrication and erection of all structural steel work with the work of other trades.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: All hot rolled steel plates, shapes, sheet piling, and bars shall be new steel conforming to ASTM A6.

   Structural steel shall comply with the provisions of the following ASTM Specifications as appropriate for the grades and types, and at the locations as specified on the drawings:

1. Structural Steel Wide Flange and WT Shapes - High Strength Steel, ASTM A992. ASTM A572, Grade 50 may be acceptable as a substitute for A992.
2. Channels - Carbon Steel, ASTM A36.
4. Structural Steel Plates and Bars - Carbon Steel, ASTM A36.
5. Steel Pipe - ASTM A53 (Type E or S) Grade B (Fy = 35 ksi).
6. Square and Rectangular HSS – ASTM A500, Grade B (Fy = 46 ksi).
7. Connection Material: Unless noted otherwise on the drawings, column stiffener plates and doubler plates at moment connections shall be the same grade of steel as the beam connecting the column (highest grade if more than one grade is used). All other connection material except as noted otherwise on the drawings including bearing plates, gusset plates, stiffener plates, filler plates, angles, etc. shall be A36 steel unless a higher or matching grade of steel with the members connected is required by strength or stiffness calculations and provided the resulting sizes are compatible with the members connected.

B. Structural Bolts and Threaded Fasteners: Structural bolts and threaded fasteners shall comply with the following ASTM Specifications as appropriate for the types and at the locations as specified on the drawings:

1. ASTM A325 Type 1.
2. Alternative Design Fasteners: Fasteners that incorporate a design feature intended to indicate a predetermined tension or torque (load indicator bolts or "twist-off" bolts) shall conform to the requirements of section 2(d) of the RCSC “Specification for Structural Joints Using ASTM A325 or A490 Bolts”. Bolts that are manufactured to conform to ASTM A325 shall additionally conform to ASTM F1852.

Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:

a. Nucor Fastener, A Division of Nucor Corporation, Conway, AR and St. Joe, IN
b. Lake Erie Screw Corp., Lakewood, OH.
c. Vermont Fasteners Manufacturing, Swanton, VT

3. Bolts and Nuts, High Strength Bolts: Bolts and nuts for all high strength bolts shall be heavy hex head conforming to ANSI Standards B18.2.1 and B18.2.2 respectively. Nuts shall conform to ASTM A563.

4. Washers: All washers shall be circular, flat and smooth and shall conform to the requirements of Type A washers in ANSI Standard B23.1. Washers for high strength bolts shall be hardened and conform to ASTM F436.

5. Galvanized Bolts: Provide bolts, nuts and washers that are hot dip galvanized according to ASTM A153, Class C when used to connect steel called for on the drawings or in the specifications as hot dip galvanized after fabrication.

6. Direct Tension Indicators: Compressible washer-type direct-tension indicators conforming to ASTM F959.

Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:

a. Applied Bolting Technology, Ludlow, VT.

b. Turnasure, LLC., Langhorne, PA.

7. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed.

8. New Bolts: All bolts shall be new and shall not be reused.

C. Electrodes for Welding: Comply with AWS D1.1, "Structural Welding Code - Steel" with a minimum Charpy V-notch toughness of 20 ft-lbs at 0°F. Electrodes for various welding processes shall be as specified below:

1. SMAW: E70XX low hydrogen
2. SAW: F7X-EXXX
3. GMAW: ER70S-X
4. FCAW: E7XT-X

Electrodes shall be compatible with parent metal joined.

D. Shear Connectors (Headed STUDs): Shear connectors and their installation shall meet all requirements specified in Section 7 of AWS D1.1 "Structural Welding Code-Steel".

Sizes of shear connectors shall be as specified on the drawings.

E. Anchor Rods:

1. All anchor rods shall conform to ASTM F1554, Grade 55 supplement 2
2. Anchor rods used with galvanized baseplates shall be galvanized.

STRUCTURAL STEEL
05 12 00-7
3. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A563.

4. Washers: Washers for all base plates shall be 1/4" thick plates extending minimum 1" from edge of base plate holes on each side with holes 1/16 inch larger than the nominal bolt diameter. Washers shall conform to ASTM A36 steel.

F. Structural Steel Primer Paint: Fabricator's Standard Rust inhibited primer that meets or exceeds the performance requirements of TTP636 with the exception of the salt fog requirements. The steel surface shall be prepared according to SSPC-SP-2 (Hand Tool Cleaning) unless noted otherwise in this specification. Refer to Architect's drawings and specifications for final paint finish requirements of structural steel. Primer paint shall be compatible with final paint requirements.

G. Non-Shrink Grout: Provide grout type(s) as specified on the drawings:

1. Non-Metallic Non-Shrink Grout: Premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents, and fluidity improving compounds. Conform to ASTM C1107. Provide the minimum strength as shown below as determined by grout cube test at 28 days:

   a. 6,000 PSI for supporting concrete 3000 psi and less.
   b. 8,000 PSI for supporting concrete greater than 3000 psi and less than or equal to 4000 psi.
   c. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4000 psi shall be 8000 psi.

   Subject to conformance with specified requirements, acceptable non-shrink grouts include:

   "14k Hy Flow" and "Sonogrout 10k" as manufactured by Sonneborn-ChemRex, Inc.

   "Masterflow 555", "Masterflow 928" and "Set Grout" as manufactured by ChemRex, Inc., MBT Protection and Repair Division.

   "Five Star Grout" as manufactured by U.S. Grout Corp.

   "NS Grout" and "Hi-Flow Grout" as manufactured by The Euclid Chemical Company.

H. Hot Dip Galvanizing:

1. Scope: Hot dip galvanize after fabrication all structural steel items and their connections permanently exposed to exterior conditions or that are within areas of unconditioned airspace, whether specified on the drawings or not. Such items include, but are not limited to:

   a. Shelf angles.
   b. Parapet wall supporting members.
   c. Embedded plates in concrete.
d. Building skin support steel exposed to moisture outside the exterior waterproofing surface.

Examine the architectural and structural drawings for other items required to be hot dipped galvanized.

Galvanize all nuts, bolts, and washers used in the connection of such steel. Field welded connections shall have welds protected with "Z.R.C. Cold Galvanizing Compound" as manufactured by Z.R.C. Products Company.

2. Surface Preparation: All steel to be hot dip galvanized shall undergo the following surface preparation as specified by the Steel Structures Painting Council (SSPC), Volume 2.

3. Zinc Coating: The zinc coating for steel shapes and plates shall conform to ASTM A123.

I. Galvanizing Repair Paint: Galvanizing repair paint shall be "ZRC Cold Galvanizing Compound" as manufactured by ZRC Chemical Products or a paint complying with SSPC-Paint 20.

2.2 FABRICATION

A. Shop Fabrication and Assembly:

1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specification and as indicated on approved final shop drawings.

2. Milled surfaces of built-up sections shall be completely assembled or welded before milling.

3. Fitted stiffeners shall be fabricated neatly between flanges, and the ends of stiffeners shall be milled or ground to secure an even bearing against abutting surfaces. All milled or ground joints shall bear throughout their contact length.

B. Dimensional Tolerances: Dimensional tolerances of fabricated structural steel shall conform to Section 6.4 of the AISC Code of Standard Practice.

C. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Engineer. Any member having a splice not shown and detailed on approved shop drawings will be rejected.

D. Cutting: Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provided the cut is not within 1/8 inch of the finished dimension and final removal is completed by means such as chipping or grinding to produce a smooth surface quality free of notches or jagged edges. All corners shall be smooth and rounded to a minimum 1/2" radius.

E. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members as shown on the contract documents, and/or the final shop drawings.
1. Provide specialty items as indicated to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. Lifting and Erection Devices: The fabricator shall be responsible for designing, detailing and furnishing all lifting devices and erection aids required for erection. Such devices shall be removed after erection if they interfere with architectural finish requirements.

2.3 WELDING

A. Code: All shop and field welding shall conform to all requirements in the "Structural Welding Code - Steel", ANSI/AWS D1.1, as published by the American Welding Society (AWS).

B. Welder Certification: All shop and field welders shall be certified according to AWS procedures for the welding process and welding position used.

C. Welding Procedure Specification: All welding shall be performed in accordance with a Welding Procedure Specification (WPS) as required in AWS D1.1 and approved by the Owner’s Testing Laboratory and the Architect/Engineer. The WPS variables shall be within the parameters established by the filler-metal manufacturer.

2.4 BOLTING

A. Minimum Bolt Diameter: Minimum bolt diameter shall be 3/4 inch.

B. Connection Type: Unless noted otherwise on the drawings, all bolted connections shall be snug-tightened using high-strength bolts in standard holes (hole diameter nominally 1/16 inch greater than the nominal bolt diameter) with threads included in the shear planes. Notwithstanding, the contractor shall be responsible to adhere to provisions of AISC Specification Section J1.11, which lists circumstances under which certain connections require fully-tightened high strength bolts.

C. Fastener Tension:

1. High strength bolts in snug-tightened joints shall be tightened to a snug tight condition only. Do not pretension bolts in snug-tightened joints the same as if they were in slip-critical joints. The snug-tightened condition is defined as the tightness that exists when all plies are in firm contact. This may usually be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.

2. High strength bolts in slip-critical and pretensioned joints shall be tightened to achieve the minimum bolt tension as specified in the AISC “Specification for Structural Joints Using ASTM A325 or A490 Bolts” when all the fasteners of a joint are tight.

Any of the four methods to tighten bolts specified in the AISC “Specification for Structural Joints Using ASTM A325 or A490 Bolts” may be used to achieve the minimum bolt tension. The tightening procedure that uses direct tension indicator washers shall conform to the requirements of ASTM F959.
2.5 CONNECTIONS

A. Typical connection details are indicated on the drawings.

B. Design Procedure:

1. The fabricator, his detailer and supervising engineer shall coordinate all connection requirements with the erector. The fabricator is responsible to detail connections that contain the adjustability and all other requirements that allow the erector to erect the structural steel in conformance to all specified tolerances.

2. The Engineer reserves the right to reject all shop drawings submitted without complete design calculations. Failure to adhere to the requirements of this section obligates the Contractor to take responsibility for any and all resulting delays in the detailing and fabrication of structural steel.

C. Flexible (Simple) Beam Connections:

1. All typical beam simple connections shall conform to requirements of the AISC specifications. Refer to the drawings for typical connection types.

2. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with architectural or MEP requirements.

D. Restrained (Moment) Connections:

1. Refer to the drawings for Moment Connection Details.

2. Design Reactions for Moment Connected Beams: Shear connections for moment-connected beams shall be designed for the reaction shown on the drawings.

3. Design and Furnishing of Reinforcement in Moment Connected Joints: As part of the design responsibility outlined above, the fabricator shall design and furnish all additional reinforcement in moment connected joints to resist the specified design forces unless otherwise specifically detailed on the drawings. Column sections shall be investigated for web shear, web yielding, web buckling, and tension. Stiffeners and/or doubler plates shall be furnished as required by the AISC Specification Section K1.

E. Tightening of Bolts in Welded Moment Connections. At moment connections where beams are complete-joint penetration welded directly to columns or girders in the field,
welds shall be made after installation of erection bolts to draw the pieces together and before the final shear connection bolts are tightened.

F. Column Splices: Bearing and Fit-Up of Column Compression Joints: Compression joints of all columns shall have bearing surfaces finished to a common plane by milling, sawing, or other suitable means. Lack of contact bearing must not exceed 1/16” or corrective measures as defined by AISC Specification M4.4 shall be required.

G. Base Plates and Bearing Plates:
   1. Attachment to Column: Unless shown otherwise on the drawings, all baseplates and bearing plates shall be welded all around to the column with minimum fillet welds as specified in AISC Specification Table J2.4.
   2. Setting Base Plates: Baseplates shall be set to the elevation indicated on the drawings and leveled using steel shims (plastic shims will not be allowed) or by three leveling screws with weldments at the plate edges. Plates shall be grouted using specified non-shrink non-metallic grout after all protruding plates have been trimmed. Tighten anchor bolts after supported members have been positioned and plumbed.
   3. Anchor Rod Holes in Baseplates: Hole sizes in baseplates for anchor rods shall be made oversize as described in the AISC Manual of Steel Construction.

H. Struts and Braces: Connections for all struts, hangers, and braces shall have connections designed to develop the full allowable tensile strength of the member.

I. Stiffeners: Provide stiffeners finished to bear under all load concentrations on supporting members, on all members framing over columns, at beam column joints (as required by the AISC Specification Section K1) and where shown on the drawings.

J. Steel Shelf Angles: Shelf angles supporting veneer shown on the drawings to be continuous shall be furnished in approximately 8'-0" lengths with at least two supports per section. Provide a 1/4" gap at each joint. The gap shall not be welded. Locate joints halfway between supports. Shelf angles shall be continuous around corners with corner joint complete penetration welded.

2.6 SURFACE PREPARATION AND SHOP PRIME PAINTING

A. Specification: Surface preparation, paint, and painting practices shall conform to the "Steel Structures Painting Manual", Volumes 1 and 2, as published by the Society for Protective Coatings (formerly the Steel Structures Painting Council (SSPC)).

B. Scope: All steel shall remain unpainted, except the following:
   1. Shop paint surfaces that are to remain exposed to view in the final construction.
   2. Shop paint any steel other than weathering steel that, in the final construction, will not be in a controlled environment and is therefore subject to moisture or high humidity infiltration and that has not been specified to be galvanized.
3. Shop paint any steel that is shown on the drawings to receive a finished paint system as defined in Specification Section 9900.

4. Extend shop paint to 2" from location of welds on surfaces that are to be field welded.

5. Extend shop paint to no closer than 2" from location of bolts on surfaces that are to receive high strength slip-critical bolts unless the paint system is certified as a Class A or greater coating.

Coordinate all shop painting of structural steel with Architect's painting requirements as specified on the architectural drawings and in the specifications.

The fabricator shall complete structural steel assemblies, including welding of units before starting shop-priming operations.

C. Surface Preparation - Unpainted Steel: All structural steel that is not specified to receive a shop coat of primer paint shall be prepared in accordance with Society for Protective Coatings specifications as follows:

1. SSPC-SP 2, “Hand Tool Cleaning” or SSPC-SP 3, “Power Tool Cleaning”

2. SSPC-SP 6, “Commercial Blast Cleaning” shall be applied to the faying surfaces of connections that are noted on the drawings as slip-critical connections requiring a Class B surface. Apply this surface preparation to the area surrounding all bolt holes including the area up to 2" outside the outer-most holes.

D. Surface Preparation and Primer Paint - Shop Painted Steel:

1. Surface Preparation: Prepare the surface of all structural steel specified to be shop painted as required by the paint manufacturer or the Society for Protective Coatings specifications, but not less than the following:

   a. SSPC-SP 2, “Hand Tool Cleaning” or SSPC-SP 3, “Power Tool Cleaning”

   b. SSPC-SP 6, “Commercial Blast Cleaning” shall be applied to the faying surfaces of connections that are noted on the drawings as slip-critical connections requiring a Class B surface or a Class A surface if the faying surface is not to be masked per Section 2.06.B.5. Apply this surface preparation to the area surrounding all bolt holes including the area up to 2" outside the outer-most holes.

2. Priming: Immediately after surface preparation, apply primer to all structural steel specified to be shop primed in strict accordance with manufacturers instructions and the Society for Protective Coatings specifications. Apply paint at a rate to conform to the manufacturer's written instructions and to provide a dry film thickness of not less the 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and all exposed surfaces. Apply two coats to surfaces that are inaccessible after assembly or erection. Change the color of the second coat to distinguish it from the first coat.

3. Finish Coat: Coordinate shop primer paint requirements with architectural drawings and specifications. The primer selected must be compatible with any specified finish coat.
E. Touch-Up Painting: The General Contractor shall provide for cleaning and touch-up painting of welds, bolted connections, and abraded areas. Apply paint to exposed areas using same materials and surface preparation as used for shop painting. Paint shall be applied by brush or spray with minimum dry film thickness of 1.5 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Request inspections of connections as required by Permit and Code.

3.2 ERECTION

A. The Erection work shall comply with the requirements of AISC Specification Section M4.

B. Inspection: Erector shall examine areas and conditions under which structural steel work is to be installed and notify the Contractor and the Architect/Engineer in writing of conditions detrimental to proper and timely completion of the work.

C. Surveys: The General Contractor shall employ a qualified land surveyor to insure accuracy in structural steel erection.

D. Temporary Shoring and Bracing:

1. The lateral-load resisting system and connecting diaphragms consist of the metal roof deck, second floor composite deck and braces as shown on the drawings. Comply with the provisions of the Code of Standard Practice regarding stability of the structure during the erection process.

2. Design and provide all required temporary shoring and bracing to hold structural framing securely in position and to safely withstand all loads as specified in the Code of Standard Practice unless larger loads are required by the local building code or specified herein. Provide all bracing, any additional structural members, and increase member sizes and/or connections shown on the drawings as required to accommodate the erection loads, methods, sequence of erection, and equipment until the lateral-load resisting or stability-providing system is completely installed.

a. For all projects located along the hurricane coastline as defined by the ASCE 7 load standard and erected during hurricane season (June 1 through October 31), also design the shoring and bracing to withstand the wind loads not less than as defined by the ASCE 7 load standard for Exposure C conditions and as modified herein. The design wind pressure shall be based on design wind velocities taken as the basic wind speed in ASCE 7 times the factor noted in the table below.

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### From one year to two years

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</tbody>
</table>

3. Provide all required erection bracing and supports to hold structural steel framing securely in position until the lateral-load resisting or stability-providing system is completely installed.

E. **Anchor Rods:** Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work.

F. **Field Modifications to Structural Steel:** Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and structural fitting of parts shall be reported immediately to the Architect/Engineer, and approval of the method of correction shall be obtained. Approved corrections shall be made at no additional cost to the Owner. Do not use cutting torches, reamers, or other devices in the field for unauthorized correction of fabrication errors.

G. **Miscellaneous Framing:** Provide supplemental structural steel support framing for metal deck where normal deck bearing is interrupted by columns, or other framing members or floor openings whether shown or not on the architectural, mechanical, or structural drawings.

H. **Removal of Erection Aids and Devices:** The erector shall remove all erection aids and devices that interfere with architectural finish or MEP requirements.

I. **Touch-Up Painting:**

1. Immediately after erection, clean field welds, bolted connections, and abraded areas that have been shop painted. Apply paint to exposed areas using same material and surface preparation as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

2. Immediately after erection, clean and repaint field welds, bolted connections and abraded areas that have been galvanized. Prepare surfaces by power disk sanding to bright metal and apply specified galvanizing repair paint in accordance with ASTM A780.

J. **Shear Connector Installation:**

1. **Steel Plates Embedded in Concrete:**
   a. Studs shall be welded using automatically timed stud welding equipment.
   b. Plates must be unpainted and free of heavy rust, mill scale, dirt, sand or other foreign material that will interfere with the welding operation.

K. **Clean Up:** Clean up all debris caused by the Work of this Section, keeping the premises neat and clean at all times.

L. **Tests and Inspections:** Refer to Testing Laboratory Services section of this specification for required tests and inspections.

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**END OF SECTION 05 12 00**

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**STRUCTURAL STEEL**

05 12 00-15
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 work of this section.

1.2 STANDARDS

A. The following Standards are listed in this specification:

- ASTM A611: Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled
- ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3 SCOPE OF WORK

A. Supplier: The metal deck supplier shall furnish all metal deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, pour stops, hanger slots or clips, metal deck edge closures, cell closures, and all related accessories.

B. Erector: The Subcontractor responsible for erecting the metal deck shall provide all labor and equipment as required to place all metal deck components and accessories as described above.

1.4 QUALIFICATIONS

A. The metal deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.5 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:


2. "Specification for the Design of Cold Formed Steel Structural Members", as published by the American Iron and Steel Institute (AISI).

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

C. Underwriters Label: Provide metal deck units which are listed and conform to Underwriters Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

1.6 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Submittal requirements.

B. Product Certification: Submit manufacturer’s specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.

C. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, pans, deck openings, special jointing, supplementary framing, and all other accessories.

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

E. Manufacturer's certification of recycled content per division 1.

F. Manufacturer’s certification regarding the use of regional materials per division 1

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. See Structural General Notes on the drawings for location of metal deck types and for depth of deck, minimum deck thickness, concrete type, total slab thickness, slab reinforcing, and design superimposed loads. The average rib width to depth of deck ratio shall be greater than or equal to 2.0. The deck thickness specified shall be considered the minimum thickness. The deck manufacturer shall be responsible for selecting the required deck thickness to carry the design superimposed load indicated for all the spans shown on the drawings and for meeting all performance criteria as specified by the SDI. Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck".

B. Acceptable manufacturers include the following:

Consolidated Systems, Inc.
Epic Metals Corp.
United Steel Deck, Inc.
Vulcraft/Div. Nucor Corp.
Wheeling Corrugating Co.

C. Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADE OF STEEL

A. Composite metal deck shall be cold formed from steel sheets conforming to ASTM A611 Grade C or D or ASTM A653, Structural Steel Grade, with a minimum yield strength of 33
ksi. The delivered thickness of the uncoated steel shall not be less than 95% of design thickness. Sheet metal accessories shall conform to the same material specification as the deck product.

2.3 FINISH

A. Galvanized: Composite metal deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 RELATED PRODUCTS

A. Flexible Closure Strips: Provide manufacturers standard vulcanized closed cell, synthetic rubber.

B. Acoustic Sound Barrier Closures: Provide manufacturers standard mineral fiber closures.

2.5 FABRICATOR

A. Metal Deck Spans: Metal deck spans shall not exceed the maximum clear spans as required by SDI criteria. Where possible, all metal deck shall extend over three or more spans. Simple span deck will not be permitted unless it is shored at midspan. All metal deck shall be designed as unshored construction unless indicated otherwise on the drawings. Any additional concrete topping specified over the composite slab shall be placed after the slab has reached 75% of its design strength.

B. Cell Closure at Ends of Metal Deck Flutes: Fabricate metal closure strips of not less than 0.0358" minimum (20 gage) cold formed sheet steel. Form to provide tight fitting cell closures at open ends of cells or flutes to prevent wet concrete from leaking through open cells.

C. Pour Stop Closures at Slab Edges: Provide sheet metal pour stop closures at all slab edges, columns, walls, and openings unless steel angles or bent plates are specified in details on the drawings. Pour stop closures and support welds shall be designed to support the wet weight of concrete and a 150 pound concentrated load acting at the slab edge without exceeding a stress of 0.8 * Fy; and the wet concrete weight alone without exceeding a stress of 0.6 * Fy and a deflection of 1/4" maximum for both vertical and horizontal deflections but with gage steel not less than the table below. The closures shall be fabricated from light gage steel not less than the thickness shown in the table below. Provide a return lip on the vertical leg in accordance with the SDI Design Manual. The overhang dimension is measured from the edge of the flange to the edge of the slab.

<table>
<thead>
<tr>
<th>Overhang</th>
<th>0&quot;-2&quot;</th>
<th>2&quot;-4&quot;</th>
<th>4&quot;-6&quot;</th>
<th>6&quot;-8&quot;</th>
<th>8&quot;-10&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab Thickness</td>
<td>6.5</td>
<td>18</td>
<td>16</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

2.6 COMPOSITE SLAB REINFORCEMENT

A. See plan.

2.7 OPENINGS IN METAL DECK
A. For unframed openings, provide block out in slab for opening with deck uncut. Cut deck at opening after concrete has reached 75% of its design strength. See typical details in the construction documents for reinforcing in the slab around all unframed openings in metal deck that are greater than 10" in width in either direction.

2.8 CHLORIDE ADMIXTURES
A. The use of admixtures in concrete containing chloride salts shall not be permitted for metal deck concrete.

2.9 EXTRA CONCRETE REQUIRED BY DECK DEFLECTION
A. The General Contractor shall include in his bid additional concrete required for metal deck slabs to account for deck deflection.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.
B. Request inspections of deck attachment and shear studs.

3.2 INSTALLATION
A. General: Install deck units as accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:

1. Place deck units on supporting framework and adjust to final position with ends accurately aligned and bearing 1 1/2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

6. Do not use floor deck units for storage or working platforms until permanently secured.

B. Attachment of Composite Deck:

1. Typical Welding of Deck: Metal deck units shall be welded to the structural support members with 5/8" puddle welds at each end of sheet and each intermediate support at each low flute, unless more frequent attachment is
specified on the drawings. Where two deck units abut each other, each unit shall be so welded.

2. Side Laps: Unless noted otherwise on the drawings, side laps of adjacent units shall be fastened by welding (1-1/2 inch long), sheet metal screws (No. 10 TEK or larger) or button punching at maximum intervals not exceeding the lesser of ½ of the span or 36".

3. Welding to Girder: Metal deck units shall be welded to girders (steel framing that is parallel to span of deck) with 5/8" ø puddle welds at 12" o.c. If the metal deck is not continuous across the girder, the deck on each side of the girder shall each be welded to the girder with 5/8" ø puddle welds at 12" o.c.

4. Welding Washers: Welding washers shall be used when welding steel deck units less than 0.028" thickness.

5. Minimum Bearing: Provide a minimum deck bearing of 1 1/2" over all supports with butted end joints.

C. Welding Requirements: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.

F. Joint Covers and Cell Closures: Weld steel sheet joint covers at abutting ends, except where taped joints are specified. Weld steel sheet column closures, cell closures and Z-closures to deck with 1" long weld at 12" maximum centers to provide tight-fitting closures at open ends of ribs, unless shown otherwise on the drawings.

G. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated. Provide minimum 2" bearing over steel support.

3.3 TOUCH-UP PAINTING

A. After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

C. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

D. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.4 INSPECTION

A. Welded decking in place is subject to inspection and testing by the Owner’s Testing Laboratory. Expense of removing and replacing portions of decking for testing purposes
will be borne by Owner if welds are found to be satisfactory. Remove work found to be
defective and replace with new acceptable work. Cost of such removal and replacement
shall be borne by the Contractor.

END OF SECTION 05 31 13
SECTION 05 31 23

STEEL ROOF DECK

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 work of this section.

1.2 STANDARDS

A. The following Standards are listed in this specification:

- ASTM A611: Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled
- ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3 SCOPE OF WORK

A. Supplier: The metal deck supplier shall furnish all metal deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, metal deck edge closures, cell closures, cant strips, sump pans, and all related accessories.

B. Erector: The Subcontractor responsible for erecting the metal deck shall provide all labor and equipment as required to place all metal deck components and accessories as described above.

1.4 QUALIFICATIONS

A. The metal deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.5 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:


2. "Specification for the Design of Cold Formed Steel Structural Members", as published by the American Iron and Steel Institute (AISI).

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

C. Factory Mutual Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Research Corporation for a FM 1-60 Windstorm Classification.

1.6 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Submit all required submittal requirements.

B. Product Certification: Submit manufacturer's specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.

C. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, supplementary framing, and all other accessories.

D. Insurance Certification: Assist Architect and Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire, windstorm, and extended coverage insurance.

E. Welding Certificates: Submit copies of certificates for welding procedures and personnel.

F. Manufacturer’s certification of recycled content per division 1.

G. Manufacturer’s certification regarding the use of regional materials per division 1.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. See Structural General Notes on the drawings for the location, depth, design thickness, and design section properties for all required roof decks.

B. Acceptable manufacturers include:

   Epic Metals Corp.
   United Steel Deck, Inc.
   Vulcraft/Div. Nucor Corp.
   Wheeling Corrugating Co.

Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADES OF STEEL

A. Steel deck shall be manufactured from steel conforming to ASTM A611 Grades C, D, or E for painted deck or A653 SS Grade 80.

2.3 FINISH
A. Galvanizing: Steel deck shall be galvanized with a protective zinc coating conforming to ASTM A924 G90.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 ROOF DECK ACCESSORIES

A. Provide minimum 20 gauge ridge and valley plates, minimum 20 gauge cant strips, minimum 14 gauge sump pans, minimum 20 gauge inside or outside closure channels angles or plates, minimum 20 gauge butt strips at change of deck directions, minimum 20 gauge filler sheets, and rubber closures as required to provide a finished surface for the application of insulation and roofing.

2.5 MECHANICAL FASTENERS

A. Powder-Actuated or Pneumatically Driven Pins: Provide corrosion-resistant, powder-actuated or pneumatically driven fasteners manufactured from steel conforming to AISI 1060 or 1061 steel, austempered to a core hardness of 52 to 58 Rockwell C. Fasteners shall have a knurled shank and shall be zinc-plated in accordance with ASTM B633, Sc. I, Type III.

Subject to compliance with requirements, provide products of one of the following manufacturers:

- Hilti, Inc., Tulsa, OK
- ITWBuildex, Itasca, IL
- Pneutek, Inc., Hudson, NH

B. Self-Drilling Screw Fasteners: Provide corrosion-resistant, hexagonal head, steel self-drilling screws, austempered to a core hardness of Rockwell C 50.

Subject to compliance with requirements, provide products of one of the following manufacturers:

- ITWBuildex, Itasca, IL

2.6 SIDE-LAP FASTENERS:

A. Provide Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter TEK screws.

2.7 FABRICATION

A. General: Fabricate deck panels, without top-flange stiffening grooves, to comply with “SDI Specifications and Commentary for Steel Roof Deck”, in SDI Publication No. 29, and the following.

B. Metal Deck Spans: Metal deck spans shall not exceed the maximum center to center spans as recommended by SDI. Where possible, all metal deck shall extend over three or more supports. Single span deck is prohibited.

C. Metal Deck Spans: Metal deck spans shall not exceed the maximum center to center spans as required by the Factory Mutual or as recommended by SDI, whichever is less. Where possible, metal decks shall extend over three or more supports. Single span deck is prohibited.
2.8 ROOF OPENINGS

A. Provide a 20 gauge galvanized flat plate to reinforce openings in roof deck that are greater than 6” and less than 10” in any one direction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Request inspection of deck attachments.

3.2 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:

1. Place deck units on supporting framework and adjust to final position with accurately aligned side laps and ends bearing 2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks. Place the end joint over a chord angle for deck bearing on steel bar joists.

2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

6. Do not use roof deck units for storage or working platforms until permanently secured.

B. Attachment of Roof Deck:

1. Method of Attachment: The deck shall be fastened to the structural support members using one of the following methods.

   a. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting member. Welding washers shall be used only when welding steel deck less than 0.028" thickness. The diameter of the puddle weld on the supporting member shall be, at a minimum, the diameter stated in the specification but no less than 1/2 inch.
b. Powder-Actuated or Pneumatically Driven Pins: An operator licensed by the pin manufacturer shall install all pins. Comply with the manufacturer's requirements to install the pins through all layers of the deck material and the manufacturer's required embedment into the supporting member.

c. Self-Drilling Fasteners: Comply with the manufacturer's requirements to install the screws through all layers of the deck material and the manufacturer's required embedment into the supporting member.

2. Side Lap Fastening: Unless required otherwise by provisions of this specification, side laps of adjacent units shall be fastened by welding (on 20 gauge or heavier deck only) or #10 (min.) TEK screws so that spacing between supports and fasteners does not exceed the lesser of ½ the span or 36 inches. Button Punching is not allowable as a side-lap fastener.

3. End Bearing: Provide a minimum end bearing of 2” over supports.

4. End Joints: End joints of sheets shall be butted or lapped 2” minimum over supports. Decks that slope 1/4 inch or more in 12 inches in the long direction shall be erected beginning at the low side to insure that end laps are shingle fashion.

5. Definition of Perimeter and Corner: Unless shown otherwise on the drawings, the definition of corner and perimeter areas shall be as noted below.

a. Definition of Roof Height: Roof height shall be defined as eave height for roofs that slope less than 10% and mean roof height for roofs with a greater slope.

b. Buildings with roof heights of 60 feet or less

   (1) Perimeter: The width of the perimeter strip shall be the smaller of one-tenth the least building dimension and four-tenths the roof height but not less than 4 feet. The strip either side of a ridgeline shall be considered as a perimeter strip for the purposes of deck fastening for roofs that slope between 10° and 45°.

   (2) Corner: On an exterior (not re-entrant) corner, a strip the width of a perimeter strip defined above and extending for a length equal to the dimension of one perimeter strip each direction from the exterior corner.

6. Minimum Attachment Requirements: Unless a more stringent attachment requirement is specified elsewhere in this specification or on the drawings, roof deck units with ribs spaced at 6” or less on center shall be attached to each structural support member at each rib where the sides lap and at a maximum of 18 inches on center in the typical condition in the field of the roof and at a maximum of 12 inches on center at eave overhangs, perimeter strips and corners. Roof deck units with ribs spaced at greater than 6” shall be attached at each rib throughout. One of the following fastening methods shall be used as a minimum requirement:

a. 5/8” diameter puddle welds

b. Powder-Actuated or Compressed-air Actuated pins, by Hilti, Inc.

c. BX 12 or BX 14 pins, by ITWBuildex, Inc.

d. K**** or SDK***** pins by Pneutek, Inc.

e. # 12 ICHTraxx self-drilling fasteners, by ITWBuildex, Inc.
7. Minimum Attachment Requirements: Unless a more stringent attachment requirement is specified elsewhere in this specification or on the drawings, roof deck units shall be attached to each structural support member at each rib where the sides lap and at a maximum of 12 inches on center in the typical condition in the field of the roof. Along the perimeter and at corners of the roof, the fastening pattern shall be reduced to a maximum of 6 inches on center. In decks with ribs greater than 6 inches on center this requirement will be met by placing two fasteners per rib. One of the following fastening methods shall be used.

   a. 5/8" diameter puddle welds
   b. Powder-Actuated or Compressed-air Actuated pins, by Hilti, Inc.
   c. BX 12 or BX 14 pins, by ITWBuildex, Inc.
   d. K***** or SDK***** pins by Pneutek, Inc.
   e. # 12 ICHTraxx self-drilling fasteners, by ITWBuildex, Inc.

8. Attachment to Girders: At locations where the deck flutes are parallel to the span of the steel framing and the top of the framing is at the bottom of the deck elevation, the deck shall be attached to the girder using one of the specified fastening methods at 18 inches on center. See the drawings for attachment details when the deck flute does not engage the top of the steel framing.

C. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

D. Reinforcement at Openings: Roof openings less than 6" square or diameter require no reinforcement. Openings 6" to 10" inclusive shall be reinforced with a 20 gauge galvanized plate welded to the deck at each corner and 6" maximum centers with a 5/8" diameter puddle weld or sheet metal screws. For openings greater than 10" in diameter or width, refer to the drawings and structural steel specifications for additional framing to support the deck around the opening.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld in each corner.

F. Joint Covers: Provide metal joint covers at changes in direction of deck units, except where taped joints are specified.

G. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, and reinforcing channels according to deck manufacturer’s written instructions. Weld to substrate to provide a complete deck installation.

H. Flexible Closure Strips: Install flexible rubber closure strips that seal the flutes of the deck when the deck cantilevers over an exterior beam and the flutes are exposed to weather and over interior partitions where there is no ceiling present and where indicated. Install with adhesive according to manufacturer’s written instructions to ensure complete closure.

3.3 TOUCH-UP PAINTING

A. After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

C. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

D. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.4 INSPECTION

A. Welded decking in place is subject to inspection and testing by designated Testing Laboratory. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work. Cost of such removal and replacement shall be borne by the Contractor.

B. The nail head stand-off distance from the top of the deck for Powder-Actuated or Compressed-Air fasteners shall be in accordance with the manufacturer's requirements and shall be verified with an inspection gauge supplied by the manufacturer. The cost of re-fastening deck that is found to be inadequately fastened shall be borne by the Contractor.

END OF SECTION 05 31 23
SECTION 05 45 23

HEALTHCARE MEDICAL SUPPORT

PART 1   GENERAL

1.1 SECTION INCLUDES

A. Summary:
   1. Performance specifications for engineered design-build support systems using cold-formed adjustable metal framing and hot-rolled steel section supports.

B. Scope:
   1. All ceiling mounted equipment including:
      a. Ceiling mounted light fixtures at Exam and Treatment rooms.
   2. Provide and install equipment support systems as located on the reflected ceiling plans and as noted in vendor site planning documents included in project documents.
   3. Reference Architectural Drawings:
   4. Ceiling Channel Grids shall be per manufacturer’s drawing - type consisting of 12 Gage 1-5/8” cold-formed channel rails flush with the finished ceiling and extending wall to wall unless otherwise noted on the reflected ceiling plans and shall be perpendicular to the path of travel of the equipment.

1.2 RELATED SECTIONS

A. Section 05 40 00 “Cold-Formed Metal Framing”

B. Section 05 50 00 “Metal Fabrications”

1.3 REFERENCES

A. All design shall be in accordance with:
   1. The governing local and state building code including IBC 2009.

B. Material Standards:
   1. ASTM A36 - Carbon Structural Steel
   2. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A325 – Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
4. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in rounds and Shapes.
5. ASTM A501 – Hot-rolled Welded and Seamless Carbon Steel Structural Tubing.
6. ASTM A572 – High-Strength Low-Allow Columbium-Vanadium Structural Steel.
8. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
9. ASTM A992 – Steel for Structural Shapes
10. A1011/A1011M-03a Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

C. Connection Standards:
   1. RCSC (Research Council on Structural Connections) – Specification for Structural Joints Using ASTM A325 or A490 Bolts.
   2. AWS D1.1 Structural Welding Code

1.4 DEFINITIONS

A. Qualified Person: Someone "... who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, work, or the project" (defined by OSHA 29 CFR 1926.32 (m)).

1.5 SUBMITTALS

A. Shop Drawings: Successful sub-contractor shall submit AutoCAD generated shop drawings (hand drawings are not acceptable) showing the complete system including plans, sections, and details of the system. Center point / Iso-centers of all equipment shall be located off of finished wall lines. Plans shall show all manufactured parts by catalog numbers, all fabricated parts, and all fasteners and hardware.

B. Calculations: Structural calculations for all member and connections shall be submitted. The Medical support system shall lend itself to a rational structural analysis with section properties of framing members demonstrated by calculations. Structural calculations and drawings shall be furnished with a stamp by a licensed engineer in the state where the installation is to occur complying with all applicable codes and regulatory requirements. Calculations must include design for deflection and rotational requirements, as applicable, and not just stress.

1.6 QUALITY ASSURANCE

A. Healthcare Metal Support Contractor Quality Assurance:
1. Material and installation shall be provided by qualified and competent persons from a Healthcare Metal Support Contractor with at least ten (10) years experienced in the professional engineering, design, manufacture and installation of adjustable metal framing supports. The Healthcare Metal Support Contractor shall demonstrate (10) year experience on projects of similar scope and size and shall maintain a continuing quality assurance program for both its material and installation crews.

2. Healthcare Metal Support Contractor shall provide the single source responsibility and liability for all engineering, design, materials and workmanship, and shall provide as single limited warranty for all aspects of the project: engineering, fabrication, material quality, and installation. Installing contractor must be a trained representative of the cold formed metal framing system manufacturer.

3. Healthcare Metal Support Contractor shall be responsible for complete coordination with the equipment suppliers to verify all loading and installation requirements and shall be responsible for directly contacting these companies for the latest design requirements.

4. Healthcare Metal Support Contractor shall employ a qualified and competent structural engineer to directly supervise all design and construction phases.

5. Acceptable Healthcare Metal Support Contractors:
   a. Unistrut Service Company of Ohio
      24400 Sperry Road
      Westlake, OH 44145
      phone: 440-348-9450
      fax: 440-348-9455

6. Healthcare Metal Support Contractor shall meet the following compliance requirements by having the following in place:
   b. Established Industrial Safety and Fall Protection Program.
   c. Minimum 10 hour Occupational Safety & Health Administration (OSHA) Training Certification.
   d. Worker's Compensation Insurance.
   e. “Installer Training” for any hybrid or adhesive anchoring systems, if applicable (Hilti)

C. Component Quality Assurance:

1. Manufacturers Brochure: Brochure shall show materials, strengths, finishes and sizes. Sufficient engineering information shall be provided to permit stress calculations. Materials listed should conform to the appropriate specifications from ASTM, AISI, AISC, and / or AWS.

2. Material Quality Assurance: Submit certification that products comply with specified requirements and are suitable for intended application.

D. Installation Quality Assurance:

1. Submit list of a minimum of 5 completed projects of similar size and complexity to this
Work. Include for each project:

a. Project name and location.
b. Name of owner.
c. Name of contractor.
d. Name of architect.
e. Name of manufacturer.
f. Number and type of supports.
g. Date of completion.

2. Pre-Installation Meeting: Convene a pre-installation meeting a minimum of two weeks before start of installation of support systems. Require attendance of parties directly affecting work of this section, including General Contractor or Owner representative, Mechanical, Plumbing and Electrical Contractor, Equipment representative and support system Medical Equipment Support Contractor. Review the following:

a. Shop Drawings.
b. Sequencing.
c. Existing Interferences.
d. Mechanical, Plumbing, and Electrical installation coordination.
e. Time restrictions.
f. Access to areas.
g. Finished Ceiling Elevations.
h. Reflected Ceiling Plan light fixture locations.
i. Final equipment center-point / iso-center locations.

1.7 LIABILITY AND WARRANTY

A. Liability: Installing contractor shall be able to furnish coverage liability insurance, with limitation of no less than five (5) million dollars. Materials, design, and installations shall be furnished by a single source Medical Equipment Support Contractor to minimize total liability.

B. Warranty: A one (1) year limited warranty on all engineering, design, materials, installation, and system performance shall be provided in writing to the Owner from the date of Owner sign-off at project completion.

1.8 DESIGN CRITERIA

A. Any designs indicated in the contract documents are for concept only and should not be taken as final designs nor shall be used for material take-off nor used for estimating purposes in any way.

B. Final designs including all final designs, materials and all installation labor shall be the exclusive and sole responsibility of the Healthcare Metal Support Contractor and all costs shall be included in their proposal at bid time.

C. The building structural members, elevations, and room layout shall be fully coordinated for the design of all supports. Equipment loads must be adequately supported from the building
structural members and distributed accordingly. Floor to floor distances, finished ceiling elevations, room locations, and building support structure elevations must all be coordinated for appropriate design of support systems for proper understanding of required hanger lengths, bracing requirements, attachment design, etc.

D. Loads to be used shall be per each equipment manufacturer’s specification.

E. An overall system minimum factor of safety of two (2) shall be used for strength design.

F. Minimum rotational requirements, unless otherwise stated in the equipment manufacturer’s specifications, shall be as follows:

1. For all Unistrut Ceiling Channel Grids and Ceiling Channel Systems: Maximum deflection on the system shall be no greater than 0.0625” for any one location of worst case loading on the system.

G. All systems shall be adequately braced in all four directions for lateral loading. If no lateral loading is specified by the equipment manufacturer’s specifications, 1/10th of the static downward loading shall be applied in the horizontal axis. Movement shall not exceed the total for that allowed on the system at the worst case loading condition.

H. For ceiling channel, rails shall be designed for no more than 1/720th of the span maximum deflection in either plane when maximum loading conditions are applied due to equipment operation.

I. Ceiling channel shall be installed horizontal in plane and parallel to each other within 1/32nd of an inch.

J. Anchorage to the existing structure shall be as designed by the structural engineer of the system.

1. Mechanical anchors into concrete shall be designed with a minimum factor of safety of 6 and shall be either expansion bolts, epoxy anchors, or through bolts with backing plate.
2. Anchorages into existing concrete shall not penetrate existing reinforcing bars.
3. Connections to structural steel shall be clamp-on fittings or field welding.
4. Drilling through truss bottom chords shall not be allowed.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Coordinate deliveries and storage of all materials with General Contractor or Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. All cold-formed channel and fittings shall be a manufactured by:

1. Unistrut Corporation or approved equal. No alternatives are approved unless written authorization from Architect is obtained.
2.2 MATERIALS

A. Channel: All cold-formed channel members shall be fabricated from structural grade steel conforming to one of the following ASTM specifications: A1011 SS GR 33 or A653 GR 33. Channel shall be 1-5/8” framing system 12 Gage. Minimum yield strength shall be 33 ksi.

B. Fittings: All cold-formed fittings shall be fabricated from steel conforming to one of the following ASTM specifications: A575, A576, A36, or A653. Minimum fitting thickness shall be ¼” with physical requirements per A1011. Minimum yield strength shall be 33 ksi.

C. Channel Nuts: All channel nuts shall be fabricated from steel conforming to ASTM specification A1011 SS GR 33.

D. Bolts and Fasteners: All bolts and fasteners used in connections shall be minimum SAE Grade 5, EG finish. Threaded Rod Grade B7.

E. Hot Rolled Structural Steel: ASTM A36 minimum.

F. Provide white vinyl filler panels at all exposed channel members at finished ceiling.

2.3 FINISHES

A. All cold-formed channel and/or fitting members shall be finished in accordance with one of the following standards:

1. Perma-Green II (GR): Rust inhibitive acrylic enamel paint finish applied by electro-deposition, after cleaning and phosphating, and thoroughly baked. Color per Federal Standard 595a color number 14109 (dark limit V-). Finish paint shall withstand minimum 400 hours salt spray (scribed), and 600 hours salt spray (unscribed), when tested in accordance with ASTM B117. Or approved equal paint finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine building drawings and areas and conditions in which systems are to be installed. Notify Architect of areas or conditions not acceptable for support of system. Do not begin installation until unacceptable areas or conditions have been corrected.

B. Design all supports to work around mechanical ductwork, electrical lighting fixtures, and plumbing where possible. All efforts shall be fully coordinated prior to final design.

3.2 INSTALLATION

A. For ceiling channel, rails shall be on centers at 2’-2” center to center as required by equipment manufacturer and allow continuous attachment along any point on the rail.
System shall be true, plumb, and level to the tolerances specified.

B. Framing shall be adjusted as required in the field to avoid interferences.

C. Hammer drilling times shall be coordinated in existing facilities with the Owner.

D. All bolted connections into cold-formed channel members with channel nuts shall be tightened to a minimum:
   1. 50 ft-lbs for ½” bolts.
   2. 100 ft-lbs for 5/8” bolts.
   3. 125 ft-lbs for ¾” bolts.

E. All bolted connections for structural steel joints shall be per ASIC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.

F. Install wall mold on Ceiling Channel Grids in rooms to receive lay-in ceiling tile where applicable.

G. Shear off tek screws on the inside of the ceiling channel for equipment mounting block installation.

H. Supply and install white snap-in closure strips into the open ceiling channel as required after the equipment has been installed unless installation labor is agreed to otherwise at the time of contract agreement.

3.3 CLEANUP

A. Upon completion of this section of work, remove all protective wraps and debris. Repair any damage due to installation of this section of work.

3.4 PROTECTION

A. During installation, it shall be the responsibility of the Healthcare Metal Support Contractor to protect this work from damage.

B. Upon completion of this scope of work, it shall become the responsibility of the general contractor to protect this work from damage during the remainder of construction on the project and until substantial completion.

C. Any modifications to the installed system shall be performed only and exclusively by the Healthcare Metal Support Contractor responsible for the system. Modifications made by any other party transfers liability and integrity of the system to that party making the modifications.

END OF SECTION 05 45 23
SECTION 05 50 00
METAL FABRICATIONS

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. Steel framing and supports for sliding glass doors.
2. Steel framing and supports for overhead grilles.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Metal bollards.

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

1. Loose steel lintels.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
3. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
1.4 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Paint products.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel framing and supports for sliding glass doors.
   2. Steel framing and supports for overhead grilles.
   3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   4. Metal bollards.
   5. Loose steel lintels.

1.5 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
   3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

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

C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 316L.

D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.

H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.


J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

K. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.
2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
   1. Fabricate units from slotted channel framing where indicated.
   2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Galvanize miscellaneous framing and supports where indicated.

2.6 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.

B. Material: Galvanized steel, with G90 coating.

C. Prime as specified in section 099113 "Exterior Painting."

2.7 ABRASIVE METAL

A. Cast-Metal Units: Cast aluminum, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
   1. Provide two rows of holes for units more than 5 inches wide, with two holes aligned at ends and intermediate holes staggered.

D. Apply bituminous paint to concealed surfaces of cast-metal units.
2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.9 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 099113 "Exterior Painting" unless material is located inside of building in which case refer to Section 099123 "Interior Painting" for primer requirements.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2.11 ALUMINUM FINISHES


B. Dark Bronze Finish: Architectural Class I, AA-M12C22A44.

C. Location of finishes will be noted in shop drawings.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

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

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers’ written instructions and requirements indicated on Shop Drawings.
B. Anchor supports for operable partitions and overhead grilles securely to, and rigidly brace from, building structure.

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

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.

B. Anchor bollards in concrete in formed or core-drilled holes not less than 36 inches deep and 6 inch larger than OD of bollard. Fill annular space around bollard solidly with 3,000 psi concrete. Slope concrete up approximately 1/8 inch toward bollard.

C. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded 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 dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting" or Section 099123 "Interior Painting" as the case maybe.

END OF SECTION 05 50 00
SECTION 05 58 13

COLUMN COVERS

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 snap-together metal column covers.
B. See Section 014500 “Windstorm Construction Requirements” for additional information regarding loads.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.
B. Shop Drawings: Show fabrication and installation details for column covers. Shop drawings shall indicate compliance with Windstorm Construction.
C. Samples for Initial Selection: For products involving selection of color, texture, or design.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing column covers similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
B. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of type indicated to metals of types indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
C. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups of typical column covers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver column covers wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

PART 2 - PRODUCTS

2.1 SNAP-TOGETHER COLUMN COVERS

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

1. Firestone Metal Products, LLC.
2. MM Systems Corporation.

B. Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages continuous mounting clips.

1. Aluminum Sheet: ASTM B 209, with not less than strength and durability properties of Alloy 5005-H32, 0.063 inch thick.
   a. Finish: Clear anodic.

2. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide flat surfaces where indicated.

3. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

4. Form returns at vertical joints to provide 1/2-inch wide reveal at joints. Provide snap-in metal filler strips at reveals that leave reveals 1/2 inch deep.

5. Fabricate column covers with hairline horizontal V-joints produced by forming returns on mating ends of column cover sections. Locate horizontal joints as indicated.

6. Fabricate base & ceiling ring to match with column covers.

2.2 MISCELLANEOUS MATERIALS

A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
1. Provide concealed fasteners for interconnecting column covers and for attaching them to other work unless otherwise indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

B. Backing Materials: Provided or recommended by column cover manufacturer.

2.3 PAINTS AND COATINGs

A. Shop Primers: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.4 FABRICATION, GENERAL

A. Coordinate dimensions and attachment methods of column covers with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends.

2.5 GENERAL FINISH REQUIREMENTS

A. Apply organic and anodic finishes to form metal after fabrication unless otherwise indicated.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M10C22A31, AAMA 611, Architectural Class II.

B. High-Performance Organic Finish: 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, 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 to match anodized finish.
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 column covers.

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

3.2 INSTALLATION

A. Locate and place column covers plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install column covers.

   1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Use concealed anchorages where possible.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.3 PROTECTION

A. Protect finishes from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05 58 13
SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

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. Wood blocking, cants, and nailers.
   2. Wood furring and grounds.
   3. Wood sleepers.
   4. Plywood backing panels.

B. Related Requirements:
   1. Section 014500 "Windstorm Construction Requirements."
   2. Section 061600 "Sheathing."

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. SPIB: The Southern Pine Inspection Bureau.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Preservative-treated wood.
   2. Fire-retardant-treated wood.
   4. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Retain subparagraph below for exposed framing if considered necessary.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: All rough carpentry materials shall be fire-retardant-treated materials, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

1. Concealed blocking.
2. Roof blocking.
3. Wood cants, nailers, blocking, and similar members in connection with roofing.
4. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.
5. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber:

1. Mixed southern pine; SPIB.
2. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

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

1. Mixed southern pine, No. 2 grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 5/8-inch nominal thickness.

2.6 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products by approved manufacturer.

B. Stainless-Steel Sheet: ASTM A 666, Type 316.
   1. Use for exterior locations and where indicated.

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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 furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
   3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.

I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
3.2 WOOD BLOCKING, AND NAILER INSTALLATION

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

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally at 24 inches o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53
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. Wall sheathing.

B. Related Requirements:

1. Section 014500 "Windstorm Construction Requirements” for pressure requirements to meet structural & anchoring requirements.
2. Section 072726 "Fluid Applied Membrane Air Barriers" for water-resistive barrier applied over wall sheathing.
3. Section 072727 “Self-Adhered Membrane Air Barrier” for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. Include data for screw size and spacing that meets requirements for Windstorm Construction.
4. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
5. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
6. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.


2.2 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. **Products**: Subject to compliance with requirements, provide the following:
   a. **GP Gypsum**, Dens Glass Gold

2. Type and Thickness: Regular, 5/8 inch thick.
3. Where noted or where required at Fire rated assemblies, 5/8 inch thick DensGlass Fireguard.
2.3 FASTENERS

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

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length and size required to meet Windstorm Construction requirements for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. See plans and specifications for additional information regarding screw type, size, and spacing requirements to meet Windstorm Construction requirements.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Windstorm Construction Requirements for buildings. See Section 014500 for additional code requirements.

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer’s written instructions.
   1. Fasten gypsum sheathing to cold-formed metal framing with screws.
   2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
   3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
   1. Space fasteners as required to meet Windstorm Construction Requirements and set back a minimum of 3/8 inch from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer’s written instructions.
   1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 16 00
SECTION 06 41 00

ARCHITECTURAL CABINETS

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. Plastic-laminate-faced architectural cabinets.
2. Exposed Wood Veneer with Transparent Finish.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
2. Section 123623.16 “Plastic Laminate Clad Countertops.”
3. Section 123623.19 “Solid Surface Countertops/Fabrications.”
4. Section 123661.19 “Quartz Agglomerate Countertops/Fabrications.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product including high-pressure decorative laminate, adhesive for bonding plastic laminate, and cabinet hardware and accessories.

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

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
1.4 INFORMATIONAL SUBMITTALS
   A. Product Certificates: For each type of product.

1.5 QUALITY ASSURANCE
   A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
   B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS
   A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
   B. Field Measurements: Where cabinets are 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 cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
   C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.

B. Grade: Custom.

C. Type of Construction: Frameless.

D. Countertop Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Formica Corporation.
   b. Panolam Industries International, Inc.
   c. Wilsonart International; Div. of Premark International, Inc.

G. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC edge banking, 0.12 inch thick, matching laminate in color, pattern, and texture. Provide edge banding for all cabinet doors and drawer edges. Also provide a front 1 – ½ inch edge bands on all countertops.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

H. Plastic Laminate Materials for Semi-exposed Surfaces:
1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS, or Thermoset decorative panels.
   a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
   b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
   c. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.

3. Drawer Bottoms: Thermoset decorative panels.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to sub-front with mounting screws from interior of body.
   1. Join sub-fronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. As selected by Architect from laminate manufacturer’s full range.
   2. As noted by Architect on interior finish plan sheet A611:
      a. Solid colors, polished finish.
      b. Solid colors with core same color as surface, polished finish.
      c. Wood grains, matte finish.
      d. Patterns, matte finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
3. Softwood Plywood DOC PS-1
4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

C. Wood Materials for Exposed Surfaces:
   1. Wood for Exposed Transparent Surfaces: Red Oak.
      a. Cut: Rift cut/rift sawn
      b. Grain Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
      c. Matching of Veneer Leaves: Slip match or per AWI “Custom Grade”.
   2. Wood for Exposed Opaque Finish surfaces: Species Birch veneer or any closed grain hardwood.

D. Wood Veneer Edge Bands: Hardwood lumber matching face veneers on exposed edges of shelves. Edge banks to be concealed type, pressure glued in place with no railing allowed. Ease visible edges by sanding.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

   1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are 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 to distinguish treated materials from untreated materials.
   3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 11 "Door Hardware (Descriptive Specification)."

B. Butt Hinges: 2 – 3/4 inch, five knuckle steel hinge made from 0.095 inch-thick metal, and as follows:
   1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
      a. HAFELE Institutional hing #354.65.200 Finish Dull Chrome
C. Back-Mounted Pulls: BHMA A156.9, B02011.
   1. Wire Pulls: Back mounted, solid metal 3.5 inches long, 5/16 inch in diameter.

D. Catches: Heavy duty Magnetic catches, BHMA A156.9, B03171.

E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.

G. Drawer Slides: BHMA A156.9.
   1. Grade 1: Side mounted full-extension type; zinc-plated steel with polymer rollers.
      a. Knape and Vogt #1300.
   2. Grade 1HD-100: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
      a. Knape and Vogt #8400.
      a. Knape and Vogt #8800.
   4. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
   5. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
   6. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
   7. For computer keyboard shelves, provide Grade 1.
   8. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.

H. Door Locks: BHMA A156.11, E07121.
   1. Comp X (National).

I. Drawer Locks: BHMA A156.11, E07041.
   1. Comp X (National).

J. Door and Drawer Silencers: BHMA A156.16, L03011.

K. Steel Counter Top Supports:
   1. A&M Hardware, 1/8 inch steel with wire-way notch, 1000 plus pound limit, size as required for countertop depth. Finish Powder coat per manufacturers standard colors.
L. Coat Rods / Flanges:

M. Coat Hooks:
   1. Ives #580 Double Hook. Finish Aluminum.

N. Grommets:
   1. Doug Mockett, #EDP “Flip-Top” Series, 3” diameter. Finish: Color as selected by architect from full range of manufacturer’s standard colors.

O. Trash Grommet:
   1. Mockett TM10 – 10” Diameter Stainless Steel.

P. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
   2. Bright Chromium Plated: BHMA 626 for brass or bronze base: BHMA 651 for steel base.

Q. For concealed hardware, provide manufacturer’s standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

B. Furring, Blocking, Shims and Hanging Strips: Softwood or hardwood lumber kiln dried to less than 15 percent moisture content.

C. Anchors: Select material, type, size, and finish required for each substrate for securing anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. 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 before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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.

PART 3 - EXECUTION

3.1 PREPARATION
A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION
A. Grade: Install cabinets to comply with same grade as item to be installed.
B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
   1. Use filler matching finish of items being installed.
F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, 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 cabinets on exposed and semi-exposed surfaces.

END OF SECTION 06 41 16
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. Plastic sheet paneling.
   2. Factory-laminated plastic sheet paneling.
B. Related Requirements:
   1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring for installing plastic paneling.
   2. Section 102600 "Wall and Door Protection" for corner guards installed over plastic paneling.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

1.5 PROJECT CONDITIONS
A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 PLASTIC SHEET PANELING

   1. Manufacturers:
   2. Subject to compliance with requirements, provide comparable product by one of the following:
      a. Crane Composites, Inc.
      b. Marlite, FRP; Basis-of-Design
      c. Nudo Products, Inc.
   3. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   4. Nominal Thickness: Not less than 0.09 inch.
   5. Surface Finish: As selected by Architect from manufacturer's full range.
   6. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Trim Accessories: Manufacturer's standard vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
   1. Color: As selected by Architect from manufacturer's full range.

B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

D. Adhesive: As recommended by plastic paneling manufacturer and with a VOC content of 50 g/L or less.

E. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer.
PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints provide equal panels at ends of walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches wide.

1. Mark plumb lines on substrate at panel joint locations for accurate installation.
2. Locate panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.

1. Drill oversized fastener holes in panels and center fasteners in holes.
2. Apply sealant to fastener holes before installing fasteners.

D. Install factory-laminated panels using concealed mounting splines in panel joints.

E. Install trim accessories with adhesive.
F. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

G. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

H. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

I. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

3.4 MATERIAL SCHEDULE

A. Plastic Panel Type **FRP-1**: Manufacturer: Crane Composites
   Series: FPR Panels, Solid
   Color: White
   Finish: Embossed
   Size: 4 feet by 0.90 inch thick

**END OF SECTION 06 64 00**
SECTION 06 64 93
DECORATIVE PLASTIC PANELING

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. Decorative plastic paneling.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring for installing decorative plastic paneling.
2. Section 066400 "Plastic Paneling" for plastic paneling requirements.
3. Section 079200 "Joint Sealants” for type of sealant types.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For decorative plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE


1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

DECORATIVE PLASTIC PANELING
06 64 93 - 1
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide plastic paneling sheets and related materials capable of withstanding normal temperature changes, including loss or breakage of plastic sheets attributable to, deterioration of plastic sheet and paneling materials, and other defects in materials and installation.

B. Plastic Paneling Design: Plastic paneling thicknesses indicated are minimums. Confirm plastic paneling thicknesses by analyzing Project loads and in-service conditions. Provide plastic paneling in the thicknesses indicated but not less than thicknesses required to meet or exceed the indicated performance requirements.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. 3Form; Varia (Basis-of-Design).
   2. DesignTex.
   3. Lightblocks.

2.3 DECORATIVE PLASTIC PANELING (RMP-*)

A. Solid polyester or acrylic resin panels.
   1. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 200 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Rate of Burning: Class CC1 for a nominal thickness of 1.5 mm (0.060 in.) per ASTM D635.
   4. Density of Smoke: Less than 75 percent per ASTM D2843.

B. Interlayer Materials: Compatible with Polyester and bonding process to create a monolithic sheet of material when complete.

B. Nominal Thickness: 3/8 inch.

C. Provide factory cut panels with tongue and groove/quirk as indicated on drawings. Corner pieces shall be line bent at the factory.

D. Colors and Patterns: As indicated on finish schedule.

E. Finish: As indicated on finish schedule.
2.4 DECORATIVE-PANELING FABRICATION

A. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
1. Sawing: Select equipment and blades suitable for type of cut required.
2. Drilling: Drills specifically designed for use with plastic products.
4. Routing.
5. Tapping.
7. Die Cutting: Not acceptable.

2.5 ACCESSORY MATERIALS

A. General: Provide accessory materials compatible with plastic paneling and acceptable to manufacturer.
1. Cleaners.
2. Bonding Cement.

B. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by decorative plastic paneling manufacturer and complying with requirements in Section 07 92 00 “Joint Sealants.”

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
D. Condition panels by unpacking and placing in installation space before installation according to manufacturer’s written recommendations.

3.3 INSTALLATION

A. Install decorative plastic paneling according to manufacturer’s written instructions.

END OF SECTION 06 64 93
SECTION 07 21 00
THERMAL INSULATION

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. Extruded Polystyrene Foam-Plastic Board
2. Glass-fiber blanket insulation.
3. Polyisocyanurate Insulation board for use at Exterior Walls & Soffits
5. Vapor retarders.

B. Related Sections:

1. Section 042000 "Unit Masonry."
2. Section 061600 "Sheathing."
3. Section 072726 "Fluid Applied Membrane Air Barrier."
4. Section 072727 "Self-Adhering Membrane Air Barrier".
5. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.
6. Section 078413 "Penetration Fire Stopping" for insulation installed as part of a perimeter fire-resistive joint system.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to 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.
PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded polystyrene boards in this article are also called “XPS boards.” Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

B. Extruded Polystyrene Board, Type X – Foundation Board Insulation: ASTM C 578, Type X, 15 psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450 respectively, per ASTM E84.

1. Owens Corning FOAMULAR 150, Square Edge (SE), thickness shall be minimum 1-1/2”.

2.2 GLASS-FIBER BLANKET INSULATION

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


2. Johns Manville.

3. Owens-Corning Fiberglas Corporation.

B. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

2.3 INSULATION FOR BUILDING ENVELOPE

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

1. Rmax.

B. Closed-Cell polyisocyanurate foam core bonded to reinforced aluminum foil facers on each side. ASTM C1289 Type I, Class 1 or 2, ASHRAE 90.1, Miami-Dade County Product NOA.

1. Products: Subject to compliance with requirements, provide the following:

a. Thermasheath – 3; thickness & R-value as shown on drawings.
2.4 MINERAL-WOOL BLANKET INSULATION

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


B. Reinforced-Foil-Faced, Mineral-Wool Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

   1. **Products**: Subject to compliance with requirements, provide the following:

      a. Johns Manville; MinWool Curtainwall Insulation; thickness in ½” increments from 1” – 6” as required for location.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

   1. **Products**: Subject to compliance with requirements, provide the following:

      a. Gemco, Spindle type Insulation Anchor.

     2. **Plate**: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

     3. **Spindle**: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

**PART 3 - EXECUTION**

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
C. Extend insulation 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. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

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. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.

2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.4 INSTALLATION OF BUILDING ENVELOPE INSULATION

A. Install board insulation for building envelope construction where indicated on Drawings according to manufacturer's written instructions.

1. Hold insulation in place by securing to metal studs with properly sized screw and placement to meet Windstorm Construction requirements.

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 07 21 00
SECTION 07 25 10
WEATHER BARRIERS – COMMERCIAL WRAP

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Weather barrier membrane (DuPont™ Tyvek® CommercialWrap®)
B. Seam Tape (DuPont™ Tyvek® Tape)
C. Flashing (DuPont™ FlexWrap™, DuPont™ FlexWrap™ NF, DuPont™ StraightFlash™, DuPont™ StraightFlash™ VF, and/or DuPont™ Thru-Wall Flashing)
D. Fasteners (DuPont™ Tyvek® Wrap Caps)

1.2 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 Retarder Material or System for Framed Building Walls
   8. ASTM E2178; Test Method for Air Permeance of Building Materials
   9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
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)

1.3 SUBMITTALS

A. Refer to Section 01 33 00 Submittal Procedures.
B. Product Data: Submit manufacturer current technical literature for each component.
C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.
D. Quality Assurance Submittals
1. Manufacturer Instructions: Provide manufacturer’s written installation instructions.

E. Closeout Submittals
1. Refer to Section 01 77 00 Contract Closeout.

1.4 QUALITY ASSURANCE

A. Qualifications
1. Installer shall have experience with installation of commercial weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer’s installation guidelines and recommendations.

1.5 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 weather barrier manufacturer.

1.6 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.
B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.7 WARRANTY

A. Provide one (1) year warranty from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com

2.2 MATERIALS
A. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® and related assembly components.

B. Performance Characteristics:
   1. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2357
   2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
   3. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.
   4. Basis Weight: 2.7 oz/yd², when tested in accordance with TAPPI Test Method T-410.
   5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
   6. Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
   7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.

2.3 ACCESSORIES

A. Seam Tape: 3 inch wide, DuPont™ Tyvek® Tape for commercial applications.

B. Fasteners:
   1. DuPont™ Tyvek® Wrap Cap Screws, as distributed by DuPont: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4” or 2” metal gasketed washer

C. Sealants
   1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
   2. Products:
      a. DuPont™ Commercial Sealant
      b. Sealants recommended by the weather barrier manufacturer.

D. Adhesives:
   1. Provide adhesive recommended by weather barrier manufacturer.
   2. Products:
      a. Liquid Nails® LN-109
      b. Denso Butyl Liquid
      c. 3M High Strength 90
      d. SIA 655
      e. Adhesives recommend by the weather barrier manufacturer.

E. Primers:
1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

2. Products:
   a. 3M High Strength 90
   b. Denso Butyl Spray
   c. SIA 655
   d. Permagrip 105
   e. ITW TACC Sta’ Put SPH
   f. Primers recommended by the flashing manufacturer

F. Flashing
   1. DuPont™ FlexWrap™, as distributed by DuPont: flexible membrane flashing materials for window openings and penetrations.
   2. DuPont™ FlexWrap™ NF, as distributed by DuPont: flexible membrane flashing materials for window openings and penetrations.
   3. DuPont™ StraightFlash™, as distributed by DuPont: straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
   4. DuPont™ StraightFlash™ VF, as distributed by DuPont: dual-sided straight flashing membrane materials for brick mold and non-flanged windows and doors.
   5. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
   6. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations. Provide fasteners and space as required to meet windstorm requirements.
B. Install weather barrier prior to installation of windows and doors.
C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers.

WEATHER BARRIERS – COMMERCIAL WRAP
07 25 10 - 4
Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

F. Window and Door Openings: Extend weather barrier completely over openings.

G. Overlap weather barrier
   1. Exterior corners: minimum 12 inches.
   2. Seams: minimum 6 inches.

H. Weather Barrier Attachment:
   1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

I. Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ or weather barrier manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING

A. Cut 9-inch wide DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.

B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanical fastening is not required for DuPont™ FlexWrap™ NF.

D. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start DuPont™ StraightFlash™ at head of opening and lap sill flashing down to the sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install DuPont™ FlexWrap™ DuPont™ FlexWrap™ NF at opening head using same installation.
procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jamb and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer’s instructions and ASTM C 1193.

I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer’s instructions and ASTM C 1193.

3.6 THRU-WALL FLASHING INSTALLATION

A. Apply primer per manufacturer’s written instructions.

B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.

E. Roll flashing into place. Ensure continuous and direct contact with substrate.

F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.

G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer’s written instructions.

H. Terminate membrane on vertical wall. Terminate into reglet, counterflashing or with termination bar.

I. Apply sealant bead at each termination.

3.7 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

A. Overlap thru-wall flashing with weather barrier by 6-inches.

B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

C. Seal vertical and horizontal seams with tape or sealing membrane.

3.8 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW HEAD

A. Cut flap in weather barrier at window head.

B. Prime exposed sheathing.

C. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.

D. Install end dams bedded in sealant.

E. Adhere 2 inches minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend ¼ inch minimum beyond outside edge of lintel to form drip edge.

F. Apply sealant along thru-wall flashing edges.

G. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.

H. Tape diagonal cuts of weather barrier.
I. Secure weather barrier flap with fasteners.

3.9 FIELD QUALITY CONTROL

A.Notify manufacturer’s designated representative to obtain periodic observations of weather barrier assembly installation.

3.10 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION 07 25 10
SECTION 07 27 26
FLUID-APPLIED MEMBRANE AIR BARRIERS

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 fluid-applied, vapor-permeable membrane air barriers.
B. Related Requirements:
   1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.
   2. Section 076200 "Sheet Metal Flashing and Trim" for flashing at base course and masonry lintel conditions.

1.3 DEFINITIONS
A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
B. Shop Drawings: For air-barrier assemblies.
1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

B. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as shown on Drawings, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

a. Coordinate construction of mockups to permit inspection by Owner's testing agency of air barrier before external insulation and cladding are installed.

b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.

c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner may engage a qualified testing agency to perform preconstruction testing on field mockups.
1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 283 or ASTM E 783.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER


1. Products: Subject to compliance with requirements, provide one of the following:

   a. Elastomeric, Modified Bituminous Membrane:
      1) Carlisle Coating & Waterproofing Inc.; Barriseal R, Barriseal S.
      2) Hohmann & Barnard, Inc.; Envior-Barrier.
3) Tremco Incorporated; ExoAir 120.

2. Physical and Performance Properties:
   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M.
   c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Counterflashing Strip: Modified bituminous, 40-mil thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil thick, cross-laminated polyethylene film with release liner backing.

D. Butyl Strip: Vapor retarding, 30 to 40 mils thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.

E. Modified Bituminous Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil thick polyethylene film with release liner backing.

F. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

G. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

H. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

I. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

J. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

K. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance value of 37 perms.

FLUID-APPLIED MEMBRANE AIR BARRIERS
07 27 26 - 4
L. Elastomeric Flashing Sheet: ASTM D 2000, minimum 50- to 65-mil thick, cured sheet neoprene with manufacturer-recommended contact adhesives and lap sealant with stainless-steel termination bars and fasteners.

M. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 079200 "Joint Sealants."

N. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

   1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

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

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

D. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.
3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install butyl strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch wide, modified bituminous or counterflashing strip.
J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

1. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
2. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil dry film thickness.

C. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material or strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.
3. Site conditions for application temperature and dryness of substrates have been maintained.
4. Maximum exposure time of materials to UV deterioration has not been exceeded.
5. Surfaces have been primed, if applicable.
6. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
7. Termination mastic has been applied on cut edges.
8. Strips and transition strips have been firmly adhered to substrate.
9. Compatible materials have been used.
10. Transitions at changes in direction and structural support at gaps have been provided.
11. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
12. All penetrations have been sealed.

C. Tests: As determined by Owner's testing agency.

D. Air barriers will be considered defective if they do not pass tests and inspections.
   1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
   2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer’s written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer’s written instructions.
   2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 07 27 26
SECTION 07 27 27

SELF-ADHERED SHEET 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Materials and installation methods for self-adhered vapor permeable air barrier membrane system located in the non-accessible part of the wall.
2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assembly.

B. Related Sections include the following:

1. Section 033000 – Cast-In-Place Concrete
2. Section 042200 – Concrete Unit Masonry
3. Section 061600 - Sheathing
4. Section 075423 – Thermoplastic Polyolefin (TPO) Roofing
5. Section 076200 – Sheet Metal Flashing and Trim
6. Section 079200 – Joint Sealants

1.3 DEFINITIONS

A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
B. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:

1. It must be continuous, with all joints made airtight.
2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf) (equal to 0.02L/sq. m @ 75 Pa), when tested in accordance with ASTM E2178.
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. It shall be durable or maintainable.
5. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
   a. Foundation and walls.
   b. Walls and windows or doors.
   c. Different wall systems.
   d. Wall and roof.
   e. Wall and roof over unconditioned space.
   f. Walls, floor and roof across construction, control and expansion joints.
   g. Walls, floors and roof to utility, pipe and duct penetrations.
6. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.5 REFERENCES

A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.

1. ASTM C920 Specifications for Elastomeric Joint Sealants
2. ASTM D412 Standard Test Methods for Rubber Properties in Tension
3. ASTM D570 Test Method for Water Absorption of Plastics
4. ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
5. ASTM D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
6. ASTM D1876 Test Method for Peel Resistance of Adhesives
7. ASTM D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting

9. **ASTM D4263** Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method


11. **ASTM D5034** Test Method for Breaking Strength and Elongation of Textile Fabrics

12. **ASTM E96** Test Methods for Water Vapor Transmission of Materials

13. **ASTM E154** Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

14. **ASTM E1186** Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems

15. **ASTM E2178** Standard Test Method for Air Permeance of Building Materials


17. **AATCC-127** Water Resistance: Hydrostatic Pressure Test (American Association of Textile Chemists and Colorists)

### 1.6 SUBMITTALS

A. **Product Data:** Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. **Shop Drawings:** Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1. Include details of interfaces with other materials that form part of air barrier.
2. Include details of mockups.

C. **Samples:** Submit representative samples of the following for approval:

1. Self-Adhered Air Barrier Membrane
2. Self-Adhered Transition Membrane
3. Self-Adhered Through Wall Flashing

D. **Product Certificates:** For air barriers, certifying compatibility of air barrier and accessory materials with project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

E. **Qualification Data:** For Applicator.

F. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.
G. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.10.

1.7 QUALITY ASSURANCE

A. Manufacturer: Air barrier systems shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of waterproofing and air barriers. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.

B. Source Limitations: Obtain primary air-barrier material and through wall flashing through one source from a single manufacturer. Should project require a vapor permeable and a vapor impermeable air barrier on same project, obtain vapor-permeable and vapor impermeable air barrier and through wall flashing from one source from a single manufacturer. See specification Section 072713 for self-adhered sheet membrane air barrier - vapor impermeable.

C. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance.

D. Mockups: Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

E. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Pre-installation conference shall include the Contractor, installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:

1. Review of submittals.
2. Review of surface preparation, minimum curing period and installation procedures.
3. Review of special details and flashings.
4. Sequence of construction, responsibilities and schedule for subsequent operations.
5. Review of mock-up requirements.
6. Review of inspection, testing, protection and repair procedures.
1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

B. Do not double-stack pallets of fluid applied components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.

C. Protect fluid-applied components from freezing and extreme heat.

D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

1.10 WARRANTY

A. Submit manufacturer's warranty that air barrier and accessories are free of defects at time of delivery and are manufactured to meet manufacturer's published physical properties and material specifications.

B. Warranty Period: Five years from date of completion of the air barrier membrane installation.

PART 2 PRODUCTS

2.1 MEMBRANE (Basis-of-Design)

A. SELF-ADHERED AIR BARRIER MEMBRANE: Perm-A-Barrier VPS manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA; a self-adhered membrane consisting of a breathable carrier film with a specially designed adhesive, which permits the transfusion of water vapor and provides superior protection against the damaging effects of air and water ingress on building structures, Product shall have the following minimum physical properties:

1. Air Permeance, ASTM E2178: Not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf) (equal to 0.02L/sq. m @ 75 Pa)
2. Assembly Air Permeance, ASTM E2357: Not to exceed 0.04 cfm/sq.ft. under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.2 L/sq.m @ 75 Pa)
3. Water Vapor Permeance, ASTM E96: Not less than 15 perms
4. Water Resistance, AATCC-127: No less than 5 hrs at 55 cm/21 inch
5. Breaking Force, ASTM D5034: 55 lbf MD, and 44 lbf CD
6. Pull Adhesion, ASTM D4541: min. 15 psi to primed glass faced gypsum sheathing, min. 12 psi to primed CMU
7. Peel Adhesion, ASTM D903: min. 5 pli to primed glass faced gypsum sheathing, min. 4 pli to Perm-A-Barrier® VPS, min. 2.5 pli to primed CMU
8. UV Exposure Limit: Not more than 150 calendar days
10. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly

B. TRANSITION MEMBRANE: Perm-A-Barrier Detail Membrane manufactured by Grace Construction Product; a 36 mil (0.9mm) of self-adhesive rubberized asphalt integrally bonded to 4 mil (0.1 mm) of cross-laminated, high-density polyethylene film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:

1. Water Vapor Transmission, ASTM E96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
2. Air Permeance at 75Pa (0.3 in. water) pressure difference: 0.0006 L/(s.m2) (0.00012 cfm/ft2) max.
4. Lap Adhesion at -4ºC (25ºF), ASTM D1876: 880 N/m (5.0 lbs./in.) of width
5. Low Temperature Flexibility, ASTM D1970: Unaffected to -43ºC (-45ºF)
6. Tensile Strength, ASTM D412, Die C Modified: min. 2.7 MPa (400 psi)
7. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: min. 200%.

C. TRANSITION ALUMINUM MEMBRANE: Perm-A-Barrier Aluminum Flashing manufactured by Grace Construction Product; a 35 mil (0.9 mm) of self-adhesive rubberized asphalt integrally bonded to 5 mil (0.1 mm) of aluminum film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:

1. Water Absorption, ASTM D570: max 0.1% by weight
3. Lap Adhesion at -4ºC (25ºF), ASTM D1876 Modified: 880 N/m (5.0 lbs./in.) of width
4. Low Temperature Flexibility, ASTM D1970 Modified: Unaffected to -26ºC (-15ºF)
5. Tensile Strength, ASTM D412, Die C Modified: min. 4.1 MPa (600 Psi)
6. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C Modified: min. 200%
D. FLEXIBLE MEMBRANE THROUGH-WALL FLASHING: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products; a 32 mil (0.8 mm) of self-adhesive rubberized asphalt integrally bonded to 8 mil (0.2 mm) of cross-laminated, high-density polyethylene film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:

1. Water Vapor Transmission, ASTM E96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
2. Water Absorption, ASTM D570: max. 0.1% by weight
4. Tear Resistance
   a. Initiation, ASTM D1004: min. 58 N (13.0 lbs.) M.D.
   b. Propagation, ASTM D1938: min. 40 N (9.0 lbs.) M.D.
5. Lap Adhesion at -4ºC (25ºF), ASTM D1876: 880 N/m (5.0 lbs./in.) of width
7. Tensile Strength, ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
8. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: min. 200%

2.2 PRIMERS

A. Primer for Primary Self-adhered air barrier membrane: Perm-A-Barrier Primer Plus manufactured by Grace Construction Products; a water-based primer which imparts an aggressive, high tack finish on the treated substrate. Product shall have the following minimum physical properties:

1. Color: Milky White (wet), Clear (dry)
2. Weight: 8.25 lbs./gal.
3. Solids Content (by wt.): 53-57%
4. Solvent Type: Water
5. VOC Content: Not to exceed 1 g/L
6. Application Temperature: 4ºC (40ºF) and above

B. Wall Primer for Self-adhered transition membrane and Self-adhered flexible membrane wall flashing: Perm-A-Barrier WB Primer manufactured by Grace Construction Products; a water-based primer which imparts an aggressive, high tack finish on the treated substrate. Product Shall have the following minimum physical properties:

1. Flash Point: No flash to boiling point
2. Solvent Type: Water
3. VOC Content: Not to exceed 10 g/L
4. Application Temperature: -4ºC (25ºF) and above
5. Freezing point (as packaged): -7ºC (21ºF)

2.3 PENETRATIONS & TERMINATION SEALANT
A. Liquid Membrane for Details and Terminations: Bituthene Liquid Membrane manufactured by Grace Construction Products; a two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/L max. VOC content.

B. Substrate Patching Membrane: Bituthene Liquid Membrane manufactured by Grace Construction Products; a two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/L max. VOC content.

C. Joint Sealant: Refer to sealant manufacturer’s recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrates and conditions are ready to accept the Work of this section. Notify [engineer] [architect] [consultant] in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

B. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the membranes. Fill voids, gaps and spalled areas in substrate to provide an even plane. Strike masonry joints full-flush.

C. Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.

3.2 SURFACE PREPARATION

A. Refer to manufacturer’s literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the air barrier assembly.

B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws in accordance with exterior sheathing manufacturers written instructions.

C. Masonry Substrates: Apply air and vapor barrier over concrete block and brick with smooth trowel-cut mortar joints, struck full and flush. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parg coat.

D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
E. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

F. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

G. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

H. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

I. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.

J. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 AIR BARRIER MEMBRANE INSTALLATION

A. Refer to manufacturer’s literature for recommendations on installation

B. Apply air barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

C. Application of Self-Adhered Air Barrier Membrane

1. Install air barrier to dry surfaces at air and surface temperatures of 4°C (40°F) and above in accordance with manufacturer’s recommendations, at locations indicated on Construction Documents.

2. Prime substrate to receive air barrier membrane as required per manufacturers written instructions.

3. Precut pieces of air barrier into easily handled lengths.

4. Remove release linear and position membrane carefully before placing against the surface.

5. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.

6. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handed countertop roller immediately after placement.

7. Overlap adjacent pieces 50 mm (2 in.) and roll seams.

8. Subsequent sheets of membrane applied above shall be positioned immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit
around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 50 mm (2 in.). Roll firmly into place.

9. Seal around masonry reinforcing or ties and all penetrations with penetration & termination sealant.

10. Coordinate the installation of air barrier with roof installer to ensure continuity of membrane with roof air barrier.

11. At end of each working day seal top edge of air barrier to substrate with termination sealant.

12. Do not expose air barrier membrane to sunlight for more than 150 days prior to enclosure.

13. Inspect installation prior to enclosing and repair punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 150 mm (6 in.) in all directions from the perimeter of the affected area.

3.4 TRANSITION MEMBRANE INSTALLATION

A. Install strips, transition membrane, and auxiliary materials according to air barrier manufacturer’s written instructions to form a seal with adjacent construction and maintain a continuous air barrier. Install all transition membrane only after application of air barrier.

B. Apply primer to substrates to receive transition membrane at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Re-prime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge transition membrane to substrate with termination sealant.

E. Apply joint sealants forming part of air barrier assembly within sealant manufacturer’s recommended application temperature ranges. Consult sealant manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition membrane so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.

1. Transition Membrane: Roll firmly to enhance adhesion.
G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

H. Repair punctures, voids, and deficient lapped seams in transition membrane. Slit and flatten fish-mouths and blisters. Patch with transition membrane extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in transition membrane have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.
8. Termination sealant has been applied on cut edges.
9. Transition membrane has been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:

1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.

D. Remove and replace deficient air barrier components and retest as specified above.

3.6 CLEANING AND PROTECTION
A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 150 days.

C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Remove masking materials after installation.

END OF SECTION 07 27 27
SECTION 07 41 13.16

STANDING-SEAM METAL ROOF PANELS

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 standing-seam metal roof panels.

B. Related Sections:
   1. Section 014500 "Windstorm Construction Requirements" for wind design loads and pressures.
   2. Section 074213 "Preformed Metal Soffit Panels" for metal panels used in horizontal soffit applications.
   3. Section 079200 "Joint Sealants"

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
   2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
   4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
   5. Review structural loading limitations of deck during and after roofing.
   6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
   7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
   8. Review temporary protection requirements for metal panel systems during and after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3 inches per 12 inches (1:5).

C. Calculations:
   1. Include calculations with registered engineer seal, verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes. See Section 014500 "Windstorm Construction Requirements" for additional requirements. See Product Evaluations from Miami-Dade County for additional requirements.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Manufacturer and Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.
1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in architectural sheet metal products.
B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
D. Retain strippable protective covering on metal panels until installation. Remove as panels are being installed. Verify film is not left on installed panels.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.
1.11 WARRANTY

A. Special Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, or perforating.
   b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Watertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.
2. Shop drawings must be provided to, reviewed, and approved by panel manufacturer prior to panel system installation.
3. Inspections by panel system manufacturer technical representative are required. Perform first inspection when underlayment and flashing are in place and second inspection when the roof is complete.

D. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks.

1. Warranty Period: Ten years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 29 percent.

B. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82] when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

C. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low and steep slope roof products.

D. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
   1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
   2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.

E. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Structural Drawings and Section 014500 of specifications.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

F. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 and ASTM E 283 at the following test-pressure difference:

G. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 and ASTM E 331 at the following test-pressure difference:
   1. Test-Pressure Difference: 15 lbf/sq. ft.

H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 90 or as required by Texas Windstorm Construction Requirements.

I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental
effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F ambient; 180 deg F material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; Cee-lock or comparable product approved by architect.
2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   a. Thickness: 0.032 inch.
   b. Surface: Smooth, flat finish.
   d. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling.
   e. Color: As selected by Architect from manufacturer's full range.
3. Clips: Continuous Cee-Rib with Vinyl Weatherseal Insert to accommodate thermal movement.
   a. Material: 0.025-inch thick, stainless-steel sheet.
4. Panel Coverage: 11.5 inches.
5. Panel Height: 1.5 inches.
2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Mid-States Asphalt Quick Stick HT Pro
   b. Polyglass Polystick MTS
   c. Soprema Lastobond Shield HT
   d. Tamko TW Underlayment or TW Metal & Tile Underlayment

B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible
metal at outlets. Finish gutter color shall be selected by architect from full range of colors. Secure gutters to meet Windstorm Construction requirements.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters. Secure downspouts to meet Windstorm Construction requirements.

F. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type, spacing and size as required to meet windstorm construction requirements and the applicable loading requirements.

G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.

1. Joint Sealant: Silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.5 INSULATION

A. Rigid insulation, thickness and R value requirements as shown on drawings, equal to Thermax Rigid Foam Insulation Board. Each board is secured to the steel deck with screws as noted in Product Evaluation RC-210.

2.6 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using factory set, non-adjustable, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer. Anchoring method to meet Windstorm Construction requirements.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.7 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
   1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil over 0.2± 0.05 mil primer coat, to provide a total dry film thickness of 0.95± 0.10 mil. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
   1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
   2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

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

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer’s written recommendations.

3.3 ROOF BOARD INSTALLATION

A. Coordinate installing roofing system components so insulation or roof boards are not exposed to precipitation or other sources of moisture.

B. Comply with product manufacturer’s and Texas Windstorm Construction requirements for most current requirements for installing insulation or roof boards.

C. Install insulation to achieve required thickness. Use at least 2 layers of insulation when the total insulation thickness exceeds 2.7 inches. Stagger joints in both directions at least 12 inches between layers.

1. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

D. Fill gaps exceeding 1/4 inch with insulation. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

E. Installation Method:

1. Mechanically Fastened: Install layer/s of insulation or roof board and secure to deck using fasteners at the spacing rate according to Texas Windstorm Construction requirements product evaluation RC-210.

3.4 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches
between courses. Overlap side edges not less than 36 inches. Roll laps with roller. Cover underlayment within 14 days or as directed by the underlayment product manufacturer.

1. Apply over the entire roof surface.
2. At minimum apply over the roof area indicated below:
   a. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
   b. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches.
   c. Rake edges for a distance of 18 inches.
   d. Hips and ridges for a distance on each side of 12 inches.
   e. Roof-to-wall intersections for a distance from wall of 18 inches.
   f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches.

B. Felt Underlayment: Apply at locations indicated below, in shingle fashion to shed water, and with lapped joints of not less than 2 inches.

1. Apply over the entire roof surface.
2. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 6 inches, in shingle fashion to shed water.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.5 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer’s written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels to be level to 1/4 inch in 20 ft.
2. Flash and seal metal panels at perimeter of all openings. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Install flashing and trim as metal panel work proceeds.
5. Panels should be continuous without end laps.
6. Align bottoms of metal panels and fasten.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use stainless-steel fasteners for surfaces exposed to the interior.
C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
   1. Install clips to supports with self-tapping fasteners.
   2. Install pressure plates, if required, at locations indicated in manufacturer's written installation instructions.
   3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied vinyl weatherseal.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without 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 achieve waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between or as required to meet Windstorm Construction requirements.
   1. Provide elbows at base of downspouts to direct water away from building.
   2. Connect downspouts to underground drainage system indicated.
J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.8 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13.16
SECTION 07 42 13

PREFORMED METAL SOFFIT PANELS

PART 1 - GENERAL

1.1 SCOPE

A. Provide and install complete, watertight, metal wall system as shown on drawings including panels, framing members, metal flashing, trim, accessories, and miscellaneous items as necessary for complete installation.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM A 653: Steel Sheet, Zinc-Coated by the Hot Dip Process
   2. ASTM A 792: Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process.
   3. ASTM B 209: Aluminum and Aluminum Alloy Sheet and Plate.


C. American Iron and Steel Institute (AISI): AISI Cold Formed Steel Design Manual

D. Aluminum Association: Aluminum Design Manual

E. Metal Construction Association (MCA): Preformed Metal Wall Guidelines


1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide factory formed, prefinished, lappable, Concealed fastener, structural, ribbed metal wall system, that has been pretested and certified by manufacturer to comply with specified requirements under installed conditions.

   1. The metal siding system including required trim members shall meet the specified requirements for wind loads.

B. Structural Requirements: Engineer panels for structural properties in accordance with latest edition of American Iron and Steel Institute’s Cold Formed Steel Design Manual using “effective width” concept and Aluminum Association’s Aluminum Design Manual.

1.4 SUBMITTALS
A. Product Data: Submit manufacturer's specifications, standard profile sheet, product data brochure and finish warranty.

B. Shop Drawings: Shop drawings showing wall elevations with layout of panels, screws, underlayment and sections of each flashing/trim condition shall be submitted for approval prior to fabrication. Drawings shall contain material type, metal thickness and finish. Drawings shall distinguish between factory and field fabrication.

C. Samples:
   1. Submit sample 12” long x full width panel, showing proposed metal gauge, seam profile and specified finish.
   2. Submit manufacturer’s standard colors for Architect’s selection.

D. Certification: Submit manufacturer's certification that materials and finishes meet specification requirements.

E. Test Reports: DMI Air and Water Infiltration Testing.
   1. ASTM-E283 Air Test
   2. ASTM-E331 Water Test

F. Windstorm Construction Compliance: Provide information regarding panels, anchoring, anchors, and spacing shall be sized and determined as required to meet Windstorm requirements. See Section 01 45 00 of these specifications for information required as part of submittal process and approval. Submittal package should include all elements to confirm product and installation meets windstorm requirements as note in specifications and structural general notes.

1.5 QUALITY ASSURANCE

A. Panel manufacturer shall have a minimum of ten (10) years of experience in manufacturing roofing and siding panels in a permanent stationary indoor facility.

B. Panel installer shall have a minimum of two (2) years experience in the installation of exposed fastener roofing and siding and show evidence of successful completion of at least three (3) projects of similar size, scope, and complexity.

1.6 DELIVERY, STORAGE, HANDLING

A. Panels and flashings shall be protected and properly packaged to protect against transportation damage in transit to the jobsite.

B. Upon delivery, exercise care in unloading, stacking, moving, storing, and erecting panels and flashings to prevent twisting, bending, scratching, or denting.
C. Store panels and flashings in a safe, dry environment under a waterproof covering to prevent water damage. Allow for adequate ventilation to prevent condensation. Panels and flashings with strippable film shall not be stored in direct sunlight.

D. Upon exposure to direct sunlight, immediately remove strippable film from panels and flashings. Protect panels and flashings from foot traffic and from all other trades.

1.7 PROJECT CONDITIONS
A. Field dimensions shall be taken prior to fabrication to verify jobsite conditions.
B. Maximum panel length is 40' (contact the factory for longer panels).

1.8 WARRANTIES
A. Panel manufacturer shall provide a twenty (20) year warranty on the paint finish covering chalking, cracking, checking, chipping, blistering, peeling, flaking, and fading.
B. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight conditions.

2.1 MATERIALS
A. Soffit Panels
   1) Exterior type 1 soffit panels shall be PacClad, 12” Flush Panel, or approved equal.
      a. Panel Description:
         i. 1” deep panel, 12” O.C
         ii. Panels to be of interlocking design with concealed fasteners.
         iii. Panels shall be 0.040” Aluminum, Kynar 500 PVDF finish.
         iv. Panels shall be square cut or cut in straight line in a neat, finished manner. Panel eave and soffit attachment to structural support shall be connected to steel panel cap as recommended by manufacturer and as indicated on manufacturer’s erection drawings.
      b. Panel Design: Panel design shall be in accordance with AISI “Specifications for the Design of Light Gauge, Cold Formed Steel Structural Members,” and in accordance with sound engineering practice.
c. Installation of panels shall be in accordance with Florida Product Approval #23157 for Soffit Panels.

PART 3 - EXECUTION

3.1 PANEL APPLICATION

A. Structural system shall be plumb before wall panels are attached. Attach panels to min. 16 ga. support member or equivalent substrate, spaced as recommended by Panel Manufacturer and required to meet windstorm construction requirements. Provide Z-Channel depths as shown on Plans. Provide thermally broken clips. Clips shall match depth of insulation and shall be spaced as recommended by the metal panel manufacturer. Clips shall support Z-channels in depths as shown on plans.

B. Vertical joints between panels to be flashed with battens/trim pieced designed to receive panel profile, with concealed fasteners and continuous sealant, forming a continuous weathertight seal.

C. Panels shall be sealed at the base, eave, corners, ends and all seems and joints according to manufacturer’s recommendations.

D. Flashing material shall be as follows:

(1) All exterior trim shall be of the same type material and finish as wall panels except as noted otherwise.

E. Provide additional sealant as required for air/water tightness equal to Sonneborn Sonolastic one-part sealant.

1) Fasteners:

a. Provide all fasteners to meet PacClad installation guidelines.

b. All base and eave structural connections shall be made in accordance with manufacturer’s recommendations.

c. Intermediate girt connections shall be by manufacturer’s approved method.

d. No exposed fasteners at concealed fastener Panels.

e. All fasteners shall be corrosion Resistant, sized and spaced to meet windstorm construction requirements for loads indicated on drawings.

3.2 INSTALLATION
A. Contractor shall provide all flashing, accessories, battens between panels, edge trim, corner trim, top and bottom closure pieces and whatever is necessary to provide complete waterproof, non-leaking installation.

B. Accessories: Shall be standard by manufacturer and as otherwise noted and indicated on drawings. Flashing and accessories shall be fastened at max. 12” o.c. Resulting metal shall lie flat to surface with no raised gap.

C. Framing Member Installation:
   1) Install all purlins, “C’s,” “Z’s,” or other framing members level, square, and plumb to building lines.
   2) Securely attach all framing members to building structural members by welding and bolting.

D. Panel Installation: Install all wall panels and soffit according to manufacturer’s written instructions and shop drawings. Alignment shall be straight, square, and parallel with neat cuts. Uneven, ragged cut edges are prohibited.
   1) All panels shall be factory cut-to-length according to the erection drawings as furnished by manufacturer.
   2) Panels shall be continuous panel length; no end laps will be allowed.
   3) Panels, trim, fasteners, etc. shall be installed with proper tools in a workmanlike manner according to manufacturer’s written directions.
   4) Panel and soffit installation shall be square to building and all panels and trim aligned. All trim shall butt tightly and miter at corners.

E. Guarantees and Warranties
   1) Manufacturer shall furnish its written manufacturer’s warranty covering materials and workmanship of the metal building components for a period of five (5) years from date as evidenced on Final Application and Certificate for Payment.
   2) Manufacturer shall furnish its written manufacturer’s Color-Cote Guarantee covering the color finish of the wall panels and trim pieces for a period of ten (10) years from date as evidenced on Final Certificate for Payment.

END OF SECTION 07 42 13
SECTION 07 42 43

ALUMINUM COMPOSITE PANEL SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and provisions of the General Conditions, Supplementary Conditions and the sections included under Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes aluminum composite panels used as the exterior or interior cladding.

1.3 PERFORMANCE REQUIREMENTS

A. Structural performance: provide exterior/interior wall cladding assemblies capable of withstanding the effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components.

   1. Dead load: As required by applicable building code.
   2. Live Load: As required by applicable building code.
   3. Wind Load: Uniform pressure (velocity pressure) acting inward or outward. See Section 014500 “Windstorm Construction Requirements” for additional requirements and design criteria.
   4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum changes in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components and other detrimental effects:
      a. Temperature Change: 120 deg F ambient; 180 deg F, material surfaces.
B. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.
C. Manufacturing, installation, and sealing shall prevent deformation of exposed surfaces.
D. Design panel system to accommodate substructure tolerance of +0 to -1/8 inch.
E. Design the system to affect a positive mechanically fastened assembly to substructure, not dependent on adhesives.
F. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening or fracturing of attachments or components of system.

G. Structural Performance / Uniform Load Deflection Test: Provide panel system that has been tested in accordance with ASTM E330 at a design pressure of 60 psf without deformation or failures of structural members. Maximum allowable deflection of span: L/60.

H. Air Infiltration: Panel system shall not have air infiltration rate more than 0.06 cfm per sq. ft. of fixed wall area when tested in accordance with ASTM E283 at static air pressure differential of 1.57 psf.

I. Static Water Penetration: Panel system shall have no water penetration as defined by in test method when tested in accordance with ASTM E331 at inward static pressure differential of not less than 6.24 psf and not more than 12.0 psf.

J. Dynamic Water Penetration: Panel system shall have been tested in accordance with AAMA 501 and shall have passed with no uncontrolled water leakage at 10.00 psf dynamic pressure differential, with water application rate of 5 gallons/hr/sqft.

K. State of Florida Building Code Product Approved Panel System

1.4 SUBMITTALS

A. Product Data: Manufacturer's product literature for the panel specified.

B. Shop Drawings: For exterior/interior wall panel assemblies and accessories. Include plans; elevations; sections and details.

C. Structural Calculations: Submit a comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement. Wind calculations shall meet requirements of Section 014500 “Windstorm Construction Requirements.”

D. Quality Assurance Submittals: Submit the following:
   1. Certificates: Product certificates signed by manufacturer certifying materials comply with the specified performance characteristics and criteria, and physical requirements.

E. Samples for initial selections: Manufacturer’s color charts showing the full range of colors available for units with factory-applied color finishes.

F. Samples for verification: Provide color samples of selected color. Samples shall involve normal color and texture variations, include sample sets showing the full range of variations expected.

G. Affidavit certifying that the material meets the requirements specified.

1.5 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services of kind indicated.
B. Manufacturer Qualifications: Minimum of 5 years experience in manufacturing exterior wall panels similar to those specified.

C. Installer Qualifications: Acceptable to manufacturer.

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer’s ordering instructions, and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.
   1. Store materials in accordance with manufacturer’s recommendations.
   2. Handle materials carefully to avoid damage to materials and finishes.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that wall panel assemblies fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.
   1. Established dimensions: where field measurements can not be made without delaying the work, guarantee dimensions and proceed with fabrication of wall panel assemblies corresponding to the established dimensions.

1.8 WARRANTY

A. Project warranty refers to Conditions of the Contract for project warranty provisions. Manufacturer's warranty: submit, for Owner's acceptance, manufacturer’s standard warranty documents executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.

B. The Contractor shall warrant the materials to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by paint manufacturer's standard multi-year warranty. The warranty shall be in writing and shall be signed by the manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Manufacturers: Subject to compliance with requirements, provide products manufactured by:
   1. Firestone Metal Products, 1001 Lund Blvd., Anoka, MN 55330
      Phone 800-426-7737, Fax 763-576-9596, www.unaclad.com
a. Series 1000 - Aluminum Composite Wall Panel System with UNA-CLIP
b. Alternate systems by other manufacturers/fabricators are to be submitted to the architect not less than 7 working days prior bid.

2.2 MATERIALS

A. Panels shall be 4mm PE core, aluminum composite material.

B. Composite panels shall have a Class “A” building material rating when tested in accordance with ASTM E84 (Steiner Tunnel Test) and shall exhibit a flame spread of 15 and a smoke developed rating of 120, with a center panel joint.

C. Panels shall have passed the ASTM E108 modified test.

2.3 FABRICATION, GENERAL

A. Composition
   1. Aluminum composite material shall be composed of a thermoplastic core sandwiched between two aluminum sheets formed in a continuous process with no applied glues or adhesives.
   2. Bond integrity per ASTM D1781-76 and ASTM C481 Cycle B, shall be a minimum of 40 in-lb.in. (Peel Strength)

B. Aluminum face sheets
   1. Thickness .020” of 3105 H25 aluminum alloy.

C. Tolerances
   1. Panel bow shall not exceed 3.8% of panel overall dimension in width or length.
   2. Panel dimensions shall be such that there will be an allowance for field adjustment and thermal movement.
   3. Panel lines, breaks and curves shall be sharp, smooth and free from warps or buckles.

D. Panel surfaces shall be free of scratches or marks caused during fabrication.

E. Ensure that entire project is manufactured from single color, coil paint run to ensure color uniformity.

F. If a metallic color is selected ensure that panel grain is maintained. Under no circumstances are panel blank sizes to be rotated even if material waste in increased.

2.4 ACCESSORIES

A. Panel attachment clips: provide UNA-CLIP at pre-engineered installation locations. UNA-CLIP to field hook and snap in to pre-punched slot in panel return flange. UNA-CLIP to be fabricated from extruded aluminum material – panel clips to ship loose for field installation.

B. Fasteners: As recommended by the panel manufacturer to meet Windstorm Construction requirements.
C. All hidden fasteners shall be Climaseal coated or stainless steel.

D. Flashing: Aluminum, same finish as for aluminum panel where exposed; secured with concealed fastening method.

E. Panel System Subgrits: Provide G90 galvanized steel of gauge and spacing required for panel system structural requirements, as recommended by panel manufacture and in accordance with approved shop drawings. To avoid galvanic reaction, separate dissimilar metals.

2.5 FINISHES, GENERAL

A. Comply with NAAMM’s Metal Finishes Manual for architectural metal products recommendations for applying and designating finishes.

2.6 ALUMINUM FINISHES

A. Panel Finishes:
   1. Coating shall be Spray-Applied Fluorocarbon Resin utilizing 70% Kynar 500 resins. Color as selected by architect from manufacturer’s “Premium” colors.
   2. Number of Coats: 4-coat. Coating shall be factory applied on a continuous process paint line. Coating shall consist of a 0.2 mil prime coat, a 0.75 mil barrier coat, a 0.75 mil metallic/color coat containing 70% Kynar resins, and a 0.5 mil clear coat containing 70% Kynar resins (Note mil thickness is approximate.)
   3. Relevant to the color selected, material to be painted in accordance with either AAMA specification 2605 or 2604.
   4. Provide factory applied strippable plastic film for protection during fabrication and installation.

B. Finish Performance:
   1. Pencil Hardness – ASTM D3352-74
   2. Shall be HB-H minimum (Eagle Turquoise).
   3. Impact Adhesion – ASTM D294-84
      a. Coating shall show no cracking and no loss of adhesion
   4. Cure Test – NCCA 11-18
      a. Coating shall withstand 50+ double rubs of MEK.
   5. Humidity Resistance – ASTM D2247-87
      a. Coating shall show no blisters after 3000 hours of 100% humidity at 95°F.
      a. After 3000 hours of exposure to 5% salt fog, at 95°F, scored sample shall show none or few #8 blisters, and less than 1/8” average creepage from scribe.
      b. No chalking greater than #8 after 10 years Florida exposure at 45° S.
c. Color Change – ASTM D2244-74

d. Color change shall not exceed 5 NBS units after 10 years Florida exposure at 45˚S.
e. After 5000 hours in Atlas Weatherometer coating shall show no objectionable chalking or color change.


C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

**PART 3 – EXECUTION**

3.1 PREPARATION

A. Coordinate setting, drawings, diagrams, templates, instructions, and directions for installation. Panel substructure shall be level and plumb. Panel substructure shall be structurally sound as determined by that subcontractor’s engineer. Panel substructure shall be free of defects detrimental to work and erected in accordance with established building tolerances. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Erect panels level and plumb, in proper alignment in relation to substructure framing and established lines.

B. Panels shall be erected in accordance with approved shop drawings.

C. Panel anchorage shall be structurally sound and per engineering recommendations.

D. Where aluminum materials come in contact with dissimilar materials, an isolation shim or tape shall be installed at fastening locations.

E. Locate and place wall panels’ level, plumb, and at indicated alignment with adjacent work.

3.3 CLEANING AND PROTECTING

A. Clean exposed surfaces of wall panels that are not protected by temporary covering to remove fingerprints and soil during construction period.

B. Clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Protect wall panels from damage during construction. Use temporary protective coverings where needed as approved by the wall panel manufacturer.

D. Clean and touch up minor abrasions in finish with air-dried coating that matches color and gloss, and is compatible with, factory-applied finish coating.
END OF SECTION 07 42 43

ALUMINUM COMPOSITE PANEL SYSTEM
07 42 43- 7
SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

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. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.
3. Roof insulation.

B. Section includes the installation of insulation strips in ribs of roof deck. Insulation strips are furnished under Section 053100 "Steel Decking."

C. Related Requirements:

1. Section 014500 "Windstorm Construction Requirements" for design criteria and additional submittal requirements for approval by Texas Department of Insurance.
2. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
5. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
1. Meet with Owner, Architect, Engineer responsible for Windstorm inspection and approval, testing and inspecting agency representative, roofing Installer, roofing system manufacturer’s representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
10. Review criteria for compliance with Windstorm Construction as found in Section 014500 of specifications.

B. Pre-installation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Engineer responsible for Windstorm inspection and approval, testing and inspecting agency representative, roofing Installer, roofing system manufacturer’s representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates required to meet Windstorm Construction requirements as noted in Section 014500 of specifications.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
   1. Base flashings and membrane terminations.
   2. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for adhered/mechanically fastened roofing.
   3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
   4. Provide Notice of Acceptance from State of Florida or a Product Evaluation from the Texas Department of Insurance indicating the roofing system meets all requirements as set forth in Section 014500 “Windstorm Construction Requirements.”
   5. Certification verifying that the TPO system has been tested and approved by Factory Mutual as well as meet all requirements of ASCE7-05 and Texas Department Insurance.

C. Samples for Verification: For the following products:
   1. Sheet roofing, of color required.
   2. Walkway pads or rolls, of color required.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of compliance with performance requirements.

B. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

C. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

D. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of roofing system.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Firestone Building Products, UltraPly TPO.

2. GAF, EverGuard TPO.
3. John Manville, TPO.

B. Source Limitations: Obtain components including roof insulation for roofing system from manufacturer approved by membrane roofing manufacturer and tested as part of approved roofing assembly to meet Windstorm Construction requirements.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:

5. Hail-Resistance Rating: MH.

D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING


1. Thickness: 60 mils, nominal.
2. Exposed Face Color: Gray or White as selected by Architect.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 SUBSTRATE BOARDS

A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

1. Products: Subject to compliance with requirements and approved Windstorm assembly, provide one of the following:
   a. Georgia-Pacific Building Products; Dens Deck.
   b. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
   c. United States Gypsum Company; Securock Glass Mat Roof Board.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck to meet windstorm requirements.

2.6 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce Windstorm Construction approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Firestone Bldg. Products.
   b. GAF.
   c. John Manville.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof
insulation and cover boards to substrate, meeting windstorm construction requirements, and acceptable to roofing system manufacturer.


1. Products: Subject to compliance with requirements, provide one of the following:

   a. Georgia-Pacific Building Products; Dens Deck.
   b. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
   c. United States Gypsum Company; Securock Glass Mat Roof Board.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

   1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
   4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
   5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer’s written instructions and meeting requirements for Windstorm Construction.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Global's "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.

2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3. Notify Engineer responsible for Windstorm Compliance at each stage of installation so they can inspection and verify compliance of installation prior to taking next step in process. Failure to not notify engineer in timely manner may result in removal of prior work to confirm compliance.

3.5 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

F. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation according to requirements in NOA or Product Evaluation for specified Windstorm Resistance Classification.
2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
3. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fasten cover boards according to requirements in NOA or Product Evaluation for specified Windstorm Resistance Classification.
2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.6 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.7 MECHANICALLY FASTENED ROOFING INSTALLATION

A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.

E. Apply roofing with side laps shingled with slope of roof deck where possible.

F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.8 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

3.9 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

E. Roofing installation shall not be considered complete until all work complies with Windstorm Construction requirements.

3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
END OF SECTION 07 54 23
SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

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. Manufactured through-wall flashing with counterflashing.
2. Manufactured reglets with counterflashing.

B. Related Requirements:

1. Section 014500 "Windstorm Construction Requirements."
2. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 077100 "Roof Specialties" for copings, roof edge specialties, reglets, and counter flashings.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leak proof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Samples for Verification: For each type of exposed finish.
   1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
   2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
   3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
   4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Wind Design: Manufacture and install copings and roof edge flashings that are approved for windstorm classification, V = 128 mph, Exposure C, I = 1.15. Identify materials with name of fabricator and design approved by Notice of Acceptance or Product Evaluation.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. As-Milled Finish: Mill.
2. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M10C22A31, Class II.
C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; with smooth, flat surface.
   1. Finish: 2D (dull, cold rolled).

D. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed, stainless-steel sheet of minimum uncoated thickness indicated; coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
   4. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.

C. Solder:
   1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
   2. For Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.


2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall, Ribbed, Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry, with ribs at 3-inch intervals along length of flashing to provide integral mortar bond. Manufacture through-wall flashing with interlocking counterflashing on exterior face, of same metal as flashing.

1. Stainless Steel: 0.016 inch thick.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) Cheney Flashing Company; Cheney Flashing Dovetail or Sawtooth.
      2) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.

B. Surface-Mount Flashing System at Masonry lintels and similar conditions: Manufacture surface sheet metal flashing with inside and outside corner pieces, termination bar, splice tape and drip plate. Surface mount flashing system shall be compatible with fluid applied air/vapor barrier.

1. Stainless Steel: Type 304, 26 gauge.

   a. Product: Subject to compliance with requirements, provide the following:

      1) Hohmann & Barnard, Inc., MFL Metal flashing & DP Standard Drip Plate.

C. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   a. Fry Reglet Corporation.
   b. Hickman Company, W. P.

3. Material: Stainless steel, 0.019 inch thick.

4. 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.

5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

6. Accessories:
   a. Flexible-Flash 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.
   b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

7. Finish: Mill.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
   2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

I. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.

5. Torch cutting of sheet metal flashing and trim is not permitted.

6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance required to meet windstorm construction requirements.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
3.3 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042113 “Brick Masonry.”

C. Reglets: Installation of reglets is specified in Section 042113 "Brick Masonry."

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

E. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00
SECTION 07 71 00
ROOF SPECIALTIES

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. Copings.
2. Roof-edge specialties.
3. Reglets and counterflashings.

B. Related Requirements:

1. Section 014500 "Windstorm Construction Requirements" for design criteria for wind.
2. Section 055000 "Metal Fabrications" for downspout guards and downspout boots.
3. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
4. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
5. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Pre-installation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer’s representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.
1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Shop Drawings: For roof specialties.
   1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
   2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
   3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
   4. Detail termination points and assemblies, including fixed points.
   5. Include details of special conditions.
C. Samples: For each type of roof specialty specified.

1.4 INFORMATIONAL SUBMITTALS
A. Product Certificates: For each type of roof specialty.
B. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.
C. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements for specified design pressure.
B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
   1. Build mockup of typical roof edge as shown on Drawings.
   2. Build mockup of typical roof edge, including fascia, approximately 10 feet long, including supporting construction, seams, attachments, and accessories.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075423 “Thermoplastic Polyolifin (TPO) Roofing.”

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstreessing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, thickness as required to meet windstorm performance requirements found in Section 014500.
   a. Surface: Smooth, flat finish.
   b. Finish: Dark Bronze, Class I, Anodized Coating, AA-M12C22A44.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.

2.3 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, thickness as required to meet windstorm performance requirements found in Section 014500.
   a. Surface: Smooth, flat finish.
   b. Finish: Dark Bronze Anodic Finish, AA-M12C22A44, Class I.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Manufacturer's standard material and thickness required to meet windstorm performance requirements found in Section 014500 of Specifications.
2.4 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Fry Reglet Corporation.
   2. Hickman Company, W.P.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
   1. Stainless Steel: 0.019 inch thick.
   2. Corners: Factory mitered and soldered.
   3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   4. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
   1. Stainless Steel: 0.019 inch thick.

D. Accessories:
   1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.

E. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished).

2.5 MATERIALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
   1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
   2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.7 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

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

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

   1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
   2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance required to meet windstorm construction requirements.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION
   A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
   B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
   1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer’s required spacing that meets performance requirements for windstorm construction requirements.
3.4 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

3.6 REGLET AND COUNTERFLASHING INSTALLATION

A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Embedded Reglets: See Section 033000 "Cast-in-Place Concrete" and Section 042113 "Brick Masonry" for installation of reglets.

C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00
SECTION 07 71 29
MANUFACTURED ROOF EXPANSION JOINTS

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. Bellows-type roof expansion joints.
2. Aluminum roof expansion joints.
B. Related Requirements:
1. Section 014500 "Windstorm Construction Requirements" for attachment requirements.
2. Section 061053 "Miscellaneous Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
3. Section 075423 "Thermoplastic Polyolefin (TPO)" for roofing system.
4. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For roof expansion joints.
1. Include plans, elevations, sections, and attachment details.
2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
3. Provide isometric drawings of intersections, terminations, and changes in joint direction or planes, depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.
4. Anchor size and spacing as required to meet Windstorm Construction Requirements.

C. Samples: For each exposed product and for each color specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

1.7 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than five Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Roof expansion joints shall withstand exposure to weather, remain watertight, and resist the movements indicated without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

C. Fire-Test-Response Characteristics: Provide fire-barrier assemblies with fire-test-response characteristics as determined by testing identical products, per test method indicated, by UL or another testing agency acceptable to authorities having jurisdiction. Assemblies shall be capable of anticipated movement while maintaining fire rating. Fire-barrier products shall bear classification marking of qualified testing agency.

2.2 ALUMINUM ROOF EXPANSION JOINTS

A. Aluminum Roof Expansion Joints: Manufactured, continuous, waterproof, joint-cover assembly; consisting of a formed or extruded metal cover secured to continuous galvanized frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing. Provide each size and type indicated, factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation. Fabricate each assembly specifically for installation configuration indicated on Drawings.

1. Roof to Wall: Equal to FlintEDGE Edge Metal Systems by Certainteed Roofing.
2. Roof to Roof: Equal to FlintEDGE Edge Metal Systems by Certainteed Roofing.
3. Cover: Formed or extruded aluminum; thickness as recommended by manufacturer to meet windstorm requirements.
5. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the cover.
   a. Thermal Insulation: Fill space above secondary seal with insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.
2.3 MATERIALS


B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Aluminum: ASTM B 209 (ASTM B 209M) for sheet and plate, ASTM B 221 (ASTM B 221M) for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
   3. Class II, Clear Anodic Finish: Architectural Class II, clear coating 0.010 mm or thicker, complying with AAMA 611.
   4. Class I, Clear Anodic Finish: Architectural Class I, clear coating 0.018 mm or thicker, complying with AAMA 611.
   5. Class I, Color Anodic Finish: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker, complying with AAMA 611.
   6. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Two-Coat Fluoropolymer: System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
      b. Three-Coat Fluoropolymer: System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.

E. EPDM Membrane: ASTM D 4637, Type standard with manufacturer for application.

F. Neoprene Membrane: Neoprene sheet recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil; and as standard with roof-expansion-joint manufacturer for application.

G. PVC Membrane: ASTM D 4434, Type standard with manufacturer for application.

H. Silicone Extrusions: ASTM D 2000, UV stabilized, and that does not propagate flame.

I. Adhesives: As recommended by roof-expansion-joint manufacturer.

J. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads. See Section 014500 Windstorm Construction Requirement for additional information.
1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.


L. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine roof-joint openings, inside surfaces of parapets, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

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

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.

1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.

2. Install roof expansion joints true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.

3. Provide for linear thermal expansion of roof expansion joint materials.

4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.

5. Provide uniform, neat seams.

6. Install roof expansion joints to fit substrates and to result in watertight performance.

7. Torch cutting of roof expansion joints is not permitted.

8. Do not use graphite pencils to mark aluminum surfaces.

B. Directional Changes and Other Expansion-Control Joint Systems: Coordinate installation of roof expansion joints with other expansion-control joint systems to result in watertight performance. Install units at directional changes and at transitions between roof expansion joints and exterior expansion-control joint systems specified in Section 079500 "Expansion Control" to provide continuous, uninterrupted, and watertight joints.
C. Splices: Splice roof expansion joints with materials provided by roof-expansion-joint manufacturer for this purpose, to provide continuous, uninterrupted, and waterproof joints.

1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

D. Fire Barrier: Install fire barrier where indicated to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.

E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

3.3 PROTECTION

A. Protect roof expansion joints from foot traffic, displacement, or other damage.

B. Remove and replace roof expansion joints and components that become damaged by moisture or otherwise.

END OF SECTION 07 71 29
SECTION 07 81 16

STANDARD DENSITY CEMENTITIOUS FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Work under this section consists of the furnishing of all labor, materials, equipment, and services necessary for, and incidental to, the complete and proper installation of all aggregate slurry fireproofing and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

B. Conform to all applicable building code requirements of all authorities having jurisdiction.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM E84  Surface Burning Characteristics
   2. ASTM E119  Standard Methods of Fire Tests of Building Construction and Materials
   3. ASTM E605  Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
   4. ASTM E736  Cohesion/Adhesion of Sprayed Fire-Resistive Material Applied to Structural Members
   5. ASTM E759  Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
   6. ASTM E760  Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
   7. ASTM E761  Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
   8. ASTM E859  Air Erosion of Sprayed Fire-Resistive Material Applied to Structural Members
   9. ASTM E937  Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members
  10. ASTM E1354  Cone Calorimeter
  11. ASTM G21  Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

B. Bureau of Building Inspection: City of San Francisco
   1. Abrasion Resistance Test Method
   2. Impact Penetration Test Method

   1. UL/ANSI 263 Fire Tests of Building Construction Materials

D. Uniform Building Code (UBC)
1. UBC Standard No. 7-6 – Thickness and Density Determination for Spray Applied Fireproofing
2. UBC Standard No. 7-7 – Methods for Calculating Fire Resistance of Steel, Concrete and Wood Construction

E. Association of the Wall and Ceiling Industry (AWCI)

F. International Building Code (IBC)

1.3 DEFINITIONS

A. Aggregate slurry Fireproofing as defined by Underwriters Laboratories Inc. (CHPX) in the latest edition of the UL Fire Resistance Directory.

B. Concealed: Fire-resistant materials applied to interior and/or exterior surfaces that are concealed from view behind other construction when the Work is completed, and are not defined as exposed.

C. Exposed: Fire-resistant materials applied to interior and/or exterior surfaces that are exposed to view when the Work is completed. Such surfaces include, but are not necessarily limited to those that are in air-handling plenums, loading docks, machine rooms, mechanical rooms, storage rooms/warehouse facilities, and that are indicated as exposed on Drawings.

D. SFRM: Sprayed fire-resistant material.

1.4 SUBMITTALS

A. Manufacturer’s Data: Submit manufacturer’s instructions for proper application of aggregate slurry fireproofing.

B. Fire Testing:
   a. Submit evidence that the aggregate slurry fireproofing has been subjected to full-scale UL 263/ASTM E119 fire testing at Underwriters Laboratories Inc., or another accredited laboratory, by the manufacturer.

C. Thickness Schedule: Provide schedule indicating material to be used, structural elements to be protected with spray applied fireproofing, hourly rating and material thickness provided and appropriate references.

D. Test Data: Independent laboratory test results for fireproofing shall be submitted for the following performance criteria:
   1. Bond Strength per ASTM E736

STANDARD DUTY CEMENTIOUS FIREPROOFING
07 81 16 -2
2. Compressive Strength per ASTM E761  
3. Deflection per ASTM E759  
4. Bond Impact per ASTM E760  
5. Air Erosion per ASTM E859  
6. Corrosion Resistance per ASTM E937  
7. Abrasion Resistance (Test Method developed by City of San Francisco, Bureau of Building Inspection)  
8. Impact Penetration (Test Method developed by City of San Francisco, Bureau of Building Inspection)  
9. High Speed Air Erosion per ASTM E859  
10. Surface Burning Characteristics per ASTM E84  
11. Combustibility per ASTM E1354 Cone Calorimeter  
12. Mold Resistance per ASTM G21

1.5 QUALITY ASSURANCE

A. Fireproofing work shall be performed by a firm acceptable to the aggregate slurry fireproofing material manufacturer.

B. Products, execution, and fireproofing thicknesses shall conform to the applicable code requirements for the required fire-resistance ratings.

B. Contractor, fireproofing subcontractor and independent testing laboratory shall attend a pre-installation conference to review the substrates for acceptability, method of application, applied thicknesses, inspection procedures and other issues.

1.6 DELIVERY, STORAGE AND HANDLING

A. Material shall be delivered in original unopened packages, fully identified as to manufacturer, brand or other identifying data and bearing the proper independent testing laboratory labels for Surface Burning Characteristic and Fire Resistance Classification.

B. Material shall be stored off the ground, under cover, and in a dry location until ready for use. All bags that have been exposed to water before use shall be found unsuitable and discarded. Stock of material is to be rotated and used prior to its expiration date.

1.7 PROJECT/SITE CONDITIONS

A. A minimum air and substrate temperature of 40°F shall be present before application of spray applied fireproofing. A minimum air and substrate temperature of 40°F must be maintained during and for 24 hours after application of the spray applied fireproofing. Provide enclosures with heat to maintain temperature.

B. Provide ventilation in poorly ventilated areas to achieve a minimum total fresh air exchange rate of 4 times per hour until the material is substantially dry.
1.8 SEQUENCING AND SCHEDULING

A. Sequence and coordinate application of aggregate slurry fireproofing with work in other sections which would interfere with efficient fireproofing application.

1.9 WARRANTY

A. Warranties: General and special warranties specified in this Article will not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

   1. Pass-through warranties provided by subcontractors to manufacturer are not acceptable.

B. Job Specific Warranty: Manufacturer's job-specific form signed by Contractor and Installer/Applicator, in which manufacturer and Installer/Applicator agrees to repair or replace SFRMs that fail in materials, densities, thicknesses, bond strength, workmanship and other performance and assembly system requirements within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.

      b. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Fireproofing shall be aggregate slurry mixture as manufactured by Grace Construction Products, Grace Korea Inc, W. R. Grace & Co.-Conn., or its processing distributors.

2.2 MATERIALS

A. Materials shall be Monokote® MK-6® factory-blended aggregate slurry fireproofing.
B. Physical Performance Characteristics: Fireproofing material shall meet the following physical performance standards:

1. **Dry Density:** The field density shall be measured in accordance with ASTM Standard E605. Minimum average density shall be that required by the manufacturer, or as listed in the UL Fire Resistance Directory for each rating indicated, or as required by the authority having jurisdiction, or a minimum average 15 pcf whichever is greater.

2. **Deflection:** Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.

3. **Bond Impact:** Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.

4. **Bond Strength:** Fireproofing, when tested in accordance with ASTM E736, shall have a minimum average bond strength of 200 psf and a minimum individual bond strength of 150 psf.

5. **Air Erosion:** Maximum allowable total weight loss of the fireproofing material shall be 0.00 g/ft² when tested in accordance with ASTM E859. Sample surface shall be “as applied” (not pre-purged) and the total reported weight loss shall be the total weight loss over a 24 hour period from the beginning of the test.

6. **High Speed Air Erosion:** Materials to be used in plenums or ducts shall exhibit no continued erosion after 4 hours at an air speed of 2500 ft/min (29 mph) when tested per ASTM E859.

7. **Compressive Strength:** The fireproofing shall not deform more than 10% when subjected to compressive forces of 1,483 psf when tested in accordance with ASTM E761.

8. **Corrosion Resistance:** Fireproofing applied to steel shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.

9. **Abrasion Resistance:** No more than 15 cm³ shall be abraded or removed from the fireproofing substrate when tested in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.

10. **Impact Penetration:** The fireproofing material shall not show a loss of more than 6 cm³ when subjected to impact penetration tests in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.

    a. **Surface Burning Characteristics:** Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:

    - Flame Spread \( 0 \)
    - Smoke Development \( 0 \)

11. **Resistance to Mold:** The fireproofing material shall be formulated at the time of manufacturing with a mold inhibitor. Fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mold growth for a period of 28 days for general use.

12. **Combustibility:** Material shall have a maximum total heat release of 20 MJ/m² and a maximum 125 kw/m² peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E1354 at
a radiant heat flux of 75 kw/m² with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.

C. Fire Resistance Classification: The spray applied fireproofing material shall have been tested and reported by Underwriters Laboratories Inc., or an other accredited laboratory, in accordance with the procedures of ANSI/ASTM E119 and shall be listed in the Underwriters Laboratories Fire Resistance Directory or the directory of another accredited testing laboratory.

D. Mixing water shall be clean, fresh, and suitable for domestic consumption and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material. Provide water with sufficient pressure and volume to meet the fireproofing application schedule.

2.3 ACCESSORIES

A. Provide accessories to comply with manufacturer’s recommendations and to meet fire resistance design and code requirements. Such accessories include, but are not limited to, any required or optional items such as Spatterkote SK-3; bonding agents, mechanical attachments; application aids such as metal lath, scrim, or netting; and Monokote Accelerator.

2.4 SOURCE QUALITY CONTROL

A. Submit evidence that the aggregate slurry fireproofing has been tested per ASTM E119 by Underwriters Laboratories Inc or another accredited testing laboratory. Include evidence that the fire testing was sponsored by the manufacturer and that the material tested was produced at the manufacturer’s facility under the supervision of laboratory personnel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. All surfaces to receive spray applied fireproofing shall be provided free of oil, grease, loose mill scale, dirt or other foreign substances which may impair proper adhesion of the fireproofing to the substrate. Where necessary, cleaning or other corrections of surfaces to receive fireproofing shall be the responsibility of the supplier of the incompatible surface.

B. Application of the fireproofing shall not begin until the contractor, applicator and fireproofing testing laboratory (inspector) have examined surfaces to receive fireproofing and determined that the surfaces are acceptable to receive the fireproofing material.

3.2 PREPARATION
A. Prior to application of the fireproofing material, a bonding agent, approved by the fireproofing material manufacturer, shall be applied to all concrete substrates to receive fireproofing.

B. Other trades shall install clips, hangers, support sleeves and other attachments required to penetrate the fireproofing, prior to application of the fireproofing materials.

C. Other trades shall not install ducts, piping, equipment or other suspended items until the fireproofing is complete.

D. Complete placing of concrete on floor and roof decking prior to application of the fireproofing to the underside of steel deck and supporting beams and joists.

E. On roof decks without a concrete cover, complete all roofing applications and roof mounted equipment installation prior to application of the fireproofing to the underside of roof decking and supporting beams and joists. Prohibit all roof traffic upon commencement of the fireproofing and until the fireproofing material is dry.

3.3 APPLICATION

A. Equipment and application procedures shall conform to the material manufacturer’s application instructions.

B. Post appropriate cautionary “Slippery When Wet” signs in all areas in contact with wet fireproofing material. Erect appropriate barriers to prevent entry by non-fireproofing workers into the fireproofing spray and mixing areas and other areas exposed to wet fireproofing material.

C. Apply a discontinuous textured spray of Spatterkote SK-3 in accordance with manufacturer’s instructions to all cellular steel floor units with flat plate on the bottom and to roof deck assemblies as required to meet the fire resistance ratings, before application of the Monokote fireproofing to these surfaces.

3.4 FIELD QUALITY CONTROL

A. The Architect will select, and the owner will pay an independent testing laboratory to randomly sample and verify the thickness and the density of the fireproofing in accordance with provisions of ASTM E605, or the "Inspection Procedure for Field-applied Sprayed Fire Protection Materials" as published by the Association of Wall and Ceiling Contractors International (AWCI), or the Uniform Building Code Standard No. 7-6. Fireproofing density samples should be tested in accordance with the displacement method in ASTM E605 to determine in-place fireproofing density.

B. The Architect will select, and the owner will pay an independent testing laboratory to randomly sample and verify the bond strength of the fireproofing in accordance with provisions of ASTM E736.
C. The results of the above tests shall be made available to all parties at the completion of pre-designated areas which shall have been determined during the pre-job conference.

3.5 CLEANING

A. After the completion of fireproofing work, application equipment shall be removed.

B. Floors shall be left in a scraped condition.

3.6 PATCHING

A. All patching and repairing of spray applied fireproofing, due to damage by other trades, shall be performed with same materials under this section, and paid for by the trade(s) responsible for the damage.

3.7 FIRE RATING SCHEDULE

Elements: New structural components added to support roof mounted exhaust fan and surround metal deck. See structural drawings for size and number of structural elements.

Fire-Resistance Rating (time in hours) schedule shall be as follows at new work:

<table>
<thead>
<tr>
<th>Structural Component</th>
<th>Hourly Rating</th>
<th>Design Reference</th>
<th>Unrestrained</th>
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<tbody>
<tr>
<td>Exterior Columns</td>
<td>3 hr.</td>
<td>X772</td>
<td>Yes</td>
</tr>
<tr>
<td>Interior TS Columns</td>
<td>3 hr.</td>
<td>X771</td>
<td>Yes</td>
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<tr>
<td>Interior Primary</td>
<td>3 hr.</td>
<td>N708</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Interior Secondary</td>
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<td>N708</td>
<td>Yes</td>
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<tr>
<td>Beams/Girders</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>Roof Construction</td>
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END OF SECTION 07 81 16
SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, and other openings indicated.

1.2 RELATED REQUIREMENTS

A. Section 07 81 16 - Standard Density Cementitious Fireproofing.

B. Section 07 84 13- Penetration Firestopping.

1.3 REFERENCE STANDARDS


F. FM 4991 - Approval of Firestop Contractors; Factory Mutual Research Corporation; 2001.


1.4 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Certificate from authority having jurisdiction indicating approval of materials used.

1.5 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

   1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Sole Source Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty subcontractor.

D. Installer Qualifications: Company specializing in performing the work of this section and:

   1. Trained by the manufacturer.
   2. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors.
   3. UL approved.

1.6 MOCK-UP

A. Install one firestopping assembly representative of each fire rating design required on project.

FIRESTOPPING
07 84 10- 2
1. Where one design may be used for different penetrating items or in different wall or floor constructions, install one assembly for each different combination.
2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.

B. Obtain approval of authority having jurisdiction before proceeding.

C. If accepted, mock-up will represent minimum standard for the Work.

D. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.7 FIELD CONDITIONS

A. Comply with firestopping manufacturer’s recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 - PRODUCTS

2.1 FIRESTOPPING - GENERAL REQUIREMENTS

A. Manufacturers:

2. Substitutions: Verify with facility maintenance team acceptable manufacturer for facility.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

2.2 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
2. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
3. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
4. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
4. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.

E. Definition: Where 2 hour and 3 hour construction is specified below, the design specified is acceptable for use in applications of that rating and less.

2.3 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

A. Concrete and Concrete Masonry Walls and Floors:

1. Floor to Floor Joints:
   a. 2 Hour Construction: UL System FF-D-1013; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
2. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Over Metal Deck Floor:
   a. 2 Hour Construction: UL System HW-D-0181; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
   b. 2 Hour Construction: UL System HW-D-1037; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

3. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Floor:
   a. 3 Hour Construction: UL System HW-D-1058; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
   b. 2 Hour Construction: UL System HW-D-0268; Hilti CP 606 Flexible Firestop Sealant.

4. Concrete/Concrete Masonry Wall to Wall Joints:
   a. 2 Hour Construction: UL System WW-D-0032; Hilti CP 606 Flexible Firestop Sealant.

B. Gypsum Board Walls:

1. Wall to Wall Joints:
   a. 2 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.

2. Top of Wall Joints at Underside of Steel Beam and Concrete Over Metal Deck Floor with Sprayed On Fireproofing:
   a. 2 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

3. Top of Wall Joints at Underside of Flat Concrete:
   a. 2 Hour Construction: UL System HW-D-1068; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

4. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
   a. 2 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

5. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
   a. 2 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.

6. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Not Cut to Fit:
a. 2 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

2.4 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Blank Openings:

1. In Floors or Walls:
   a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE Intumescent Firestop Sealant.

B. Penetrations Through Floors or Walls By:

1. Multiple Penetrations in Large Openings:
   a. 3 Hour Construction: UL System C-AJ-1140; Hilti CP 637 Firestop Mortar.
   b. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE Intumescent Firestop Sealant.

2. Floor Drains:

3. Uninsulated Metallic Pipe, Conduit, and Tubing:
   a. 3 Hour Construction: UL System C-AJ-1184; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 3 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE Intumescent Firestop Sealant.
   c. 2 Hour Construction: UL System C-AJ-1498; Hilti CP 680-P/M Cast-In Device.

4. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 3 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
   b. 2 Hour Construction: UL System C-AJ-2567; Hilti FS-ONE Intumescent Firestop Sealant.

5. Electrical Cables Not In Conduit:
   a. 3 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System C-AJ-3216; Hilti CP 658 Firestop Plug.
   c. 2 Hour Construction: UL System W-J-3200; Hilti CP653 Speed Sleeve.

6. Electrical Busways:
a. 3 Hour Construction: UL System C-AJ-6017; Hilti FS-ONE Intumescent Firestop Sealant.

7. Insulated Pipes:
   a. 3 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE Intumescent Firestop Sealant.

8. HVAC Ducts, Uninsulated:
   a. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System C-AJ-7084; Hilti FS-ONE Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CP 601S Elastomeric Firestop Sealant, or CP 604 Self-Leveling Firestop Sealant.

C. Penetrations Through Floors By:
   1. Multiple Penetrations in Large Openings:

2. Uninsulated Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.

3. Electrical Cables Not In Conduit:
   a. 2 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.

4. Electrical Busways:

5. Insulated Pipes:
   a. 2 Hour Construction: UL System F-A-5015; Hilti CP 680-P/M Cast-In Device.
   b. 2 Hour Construction: UL System F-A-5017; Hilti CP 680-P/M Cast-In Device.

D. Penetrations Through Walls By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE Intumescent Firestop Sealant.

2. Electrical Cables Not In Conduit:
   a. 2 Hour Construction: UL System W-J-3060; Hilti FS-ONE Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.

3. Insulated Pipes:
   a. 2 Hour Construction: UL System W-J-5041; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System W-J-5042; Hilti FS-ONE Intumescent Firestop Sealant.

4. HVAC Ducts, Uninsulated:
   a. 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.

5. HVAC Ducts, Insulated:
   a. 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE Intumescent Firestop Sealant.

2.5 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Blank Openings:
   1. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.

B. Penetrations By:
   1. Multiple Penetrations in Large Openings:
      a. 2 Hour Construction: UL System W-L-1408; Hilti FS-ONE Intumescent Firestop Sealant.
      b. 2 Hour Construction: UL System W-L-8071; Hilti FS-ONE Intumescent Firestop Sealant.
      c. 2 Hour Construction: UL System W-L-8079; Hilti FS-ONE Intumescent Firestop Sealant.
      d. 2 Hour Construction: UL System W-L-8087; Hilti FS 657 Fire Block.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE Intumescent Firestop Sealant.
      b. 2 Hour Construction: UL System W-L-1164; Hilti FS-ONE Intumescent Firestop Sealant.
c. 2 Hour Shaftwall Construction: UL System W-L-1206; Hilti FS-ONE Intumescent Firestop Sealant.

3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
   b. 2 Hour Construction: UL System W-L-2474; Hilti FS-ONE Intumescent Firestop Sealant.

4. Electrical Cables Not In Conduit:
   a. 2 Hour Construction: UL System W-L-3065; Hilti FS-ONE Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
   b. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
   c. 2 Hour Construction: UL System W-L-3395; Hilti CP653 Speed Sleeve.

5. Insulated Pipes:
   a. 2 Hour Construction: UL System W-L-5028; Hilti FS-ONE Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.

6. HVAC Ducts, Insulated:
   a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE Intumescent Firestop Sealant.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION
   A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
   B. Remove incompatible materials that could adversely affect bond.
   C. Install damming materials to arrest liquid material leakage.
3.3 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authority having jurisdiction.

C. Install labeling required by code.

3.4 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.5 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00
SECTION 07 84 13
PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.
   3. Penetrations in smoke barriers.

B. Related Requirements:
   1. Section 078400 "Firestopping" for all joints and penetrations in fire-resistant rated and smoke resistant assemblies, and other openings indicated.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

   1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
   a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

   1. Hilti, Inc.
   2. 3M Fire Protection Products

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
   2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
   3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. 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.

H. 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. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping 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 of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming 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.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping 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 that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Penetration Firestopping Systems with No Penetrating Items:
   2. F-Rating: 2 hour.
   4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
   5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
   6. W-Rating: No leakage of water at completion of water leakage testing.
   7. Type of Fill Materials: As required to achieve rating.

C. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing
   2. F-Rating: 2 hour.
   4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
   5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
   6. W-Rating: No leakage of water at completion of water leakage testing.
   7. Type of Fill Materials: As required to achieve rating.

D. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing:
   2. F-Rating: 2 hour.
   4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
   5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

E. Penetration Firestopping Systems for Electrical Cables:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

F. Penetration Firestopping Systems for Cable Trays with Electric Cables:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

G. Penetration Firestopping Systems for Insulated Pipes:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

H. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

I. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

J. Penetration Firestopping Systems for Groupings of Penetrants:

2. F-Rating: 2 hour.
4. L-Rating at Ambient: Less than 5.0 cfm/sq. ft.
5. L-Rating at 400 Deg F: Less than 5.0 cfm/sq. ft.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

END OF SECTION 07 84 13
SECTION 07 92 00

JOINT SEALANTS

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. Silicone joint sealants.
   2. Nonstaining silicone joint sealants.
   3. Mildew-resistant joint sealants.
   4. Latex joint sealants.
   5. Closed Cell flute plugs for metal decking.
   6. Cross Linked, Closed Cell, Ethylene/Vinyl/Acetate Foam.

B. Related Requirements:
   1. Section 079219 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product and foam flute/decking beam joint closure.

B. Samples for Initial Selection: Manufacturer’s color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of joint sealant and foam closure, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.
   1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

1. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

1.8 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Ten years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

   JOINT SEALANTS
   07 92 00 - 2
1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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. Dow Corning Corporation, 790.
   b. GE Silicones, Silpruf.
   c. Pecora Corporation, 864.
   d. Pecora Corporation, 890.
   e. Tremco Inc., Spectrum 1.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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. Dow Corning Corporation, 756 SMS.
   b. Pecora Corporation, 864 NST, s98 NST

2.4 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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. Pecora Corporation, Dynatrol I-XL.
   b. Sherwin Williams Company, Stampede -1, Stampede – TX.
   c. Sika Corporation, Sikaflex Textured Sealant.
   d. Tremco Inc., Dymonic.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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. GE Construction Sealants; Momentive Performance Materials Inc; SCS1700 Sanitary.
   b. Tremco Incorporated; Tremisil 200.
   c. Dow Corning, 786.

2.6 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
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. Pecora Corporation, BC-158.
   b. Tremco Inc., Butyl Sealant.

2.7 **LATEX JOINT SEALANTS**

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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. BASF Corporation; Construction Systems.
   b. Pecora Corporation; AC-20.
   c. Sherwin-Williams Company (The); 850A Siliconized Acrylic Latex Caulk.
   d. Tremco Incorporated; Tremflex 834.

2.8 **JOINT-SEALANT BACKING**

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.9 **CLOSURES**

A. Closed cell closure plugs for metal decking at top of walls extending to deck, as hot or cold applied sealant backup to fill vertical & horizontal joints at penetrations through exterior envelope wall, and acoustical partition closures.

1. Manufacturer: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
2.10 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: 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 performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   a. Masonry.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
   a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
4. Provide flush joint profile according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth according to Figure 8C in ASTM C 1193.
   a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING
A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION
A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE
   1. Joint Locations:
      a. Control and expansion joints in masonry.
      b. Joints between metal panels.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors and windows.
      e. Control and expansion joints in and other.
      f. Other joints as indicated on Drawings.
   2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Tile control and expansion joints.
      c. Joints on underside of plant-precast structural concrete planks.
2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:
   a. Control joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:
   a. Aluminum thresholds.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00
SECTION 07 92 19

ACOUSTICAL JOINT SEALANTS

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 acoustical joint sealants.

B. Related Requirements:
   1. Section 079200 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for non-acoustical applications.

1.3 ACTION SUBMITTALS

A. Product Data: For each acoustical joint sealant.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Acoustical-Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Sample Warranties: For special warranties.
1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

2.2 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. GE Construction Sealants; Momentive Performance Materials Inc; RCS20 Acoustical.
   b. Pecora Corporation; AC-20 FTR.
   c. Tremco Incorporated; Tremco Acoustical Sealant.
   d. United States Gypsum Company; SHEETROCK Acoustical Sealant.

2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.


1. Products: Subject to compliance with requirements, provide one of the following:

   a. Pecora Corporation; BA-98.
2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of
Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 19
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 interior expansion joint cover assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.
   1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
   2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples: For each expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

D. Samples for Initial Selection: For each type of exposed finish.
   1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.

E. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

F. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
   1. Manufacturer and model number for each expansion joint cover assembly.
   2. Expansion joint cover assembly location cross-referenced to Drawings.
   3. Nominal, minimum, and maximum joint width.
4. Movement direction.
5. Materials, colors, and finishes.
6. Product options.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.
B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.

1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

B. Expansion Joint Design Criteria:

1. Type of Movement: Thermal, Wind sway.
a. Nominal Joint Width: As indicated on Drawings.
b. Minimum Joint Width: As indicated on Drawings.
c. Maximum Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.
   a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

A. Metal-Plate Floor Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
   1. Application: Floor to floor, Floor to wall.
   2. Installation: Surface mounted.
   3. Load Capacity:
      a. Uniform Load: 50 lb/sq. ft.
      b. Concentrated Load: 300 lb.
      c. Maximum Deflection: 0.0625 inch.
   4. Fire-Resistance Rating: Not less than two hour rating.
   5. Cover-Plate Design: Plain.
   6. Exposed Metal:
      a. Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

B. Center-Plate Floor Joint Cover: Assembly consisting of center plate that slides over metal frames fixed to sides of joint gaps.
   1. Application: Floor to floor & Floor to wall.
   2. Installation: Recessed.
   3. Load Capacity:
      a. Uniform Load: 50 lb/sq. ft.
      b. Concentrated Load: 300 lb.
      c. Maximum Deflection: 0.0625 inch.
   4. Fire-Resistance Rating: Not less than two hour rating.
   5. Cover-Plate Design: Plain.
   6. Exposed Metal:
      Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

C. Single Seal Joint System: Recessed/Flush mount system consisting of structural spines and Santoprene Seal.
   1. Recessed and Surface Mount systems
   2. Joint range applications 1-3” [25-75mm]
   3. Joint operating range 25%+- of total nominal joint width
   4. New and existing construction applications
5. Santoprene Seal traits:
   a. Dual durometer extruded Santoprene with Shore Hardnesses of 60 Shore A and 40 Shore D to ensure longevity of installation. Single durometer seals shall not be allowed.
   b. Flat seal must maintain inherent dimensional stability and include structural spine inserts (where applicable) allowing for additional load resistance.
6. Frames adaptable to multiple floor finishes
7. Addresses Standard Loading conditions
8. Manufacturer: Inpro - Series 103 – VCT Expansion Joint Systems

Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

D. Glide Plate Joint System: Recessed mount system adaptable to multiple floor finishes for new to existing conditions.

1. Recessed Mounting System
2. Joint range applications 1-6” [25-150mm]
3. Joint operating range 50%+- of total nominal joint width
4. Adaptable to multiple floor finishes
5. Coverplate and frames must be segregated by high durometer seals to eliminate system rattle.
6. Concealed hardware configuration
7. Addresses Standard Loading conditions
8. Manufacturer: Inpro - Series 320 for New to Existing Conditions

Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

2.4 WALL EXPANSION JOINT COVERS

A. Metal-Plate Wall Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.

1. Application: Wall to wall & Wall to corner.
2. Fire-Resistance Rating: Not less than that of adjacent construction rating.
3. Exposed Metal:

   Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

B. Center-Plate Wall Joint Cover: Assembly consisting of center plate that slides over gaskets in metal frames fixed to sides of joint gaps.

1. 
2. Application: Wall to wall & Wall to corner.
3. Fire-Resistance Rating: Not less than that of adjacent construction rating.
4. Exposed Metal:

   Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.
2.5 CEILING EXPANSION JOINT COVERS

A. Metal-Plate Ceiling Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
   1. Application: Ceiling to ceiling & Wall to ceiling.
   2. Fire-Resistance Rating: Not less than that of adjacent construction rating.
   3. Exposed Metal:
      a. Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

B. Center-Plate Ceiling Joint Cover: Assembly consisting of center plate that slides over gasket in metal frames fixed to sides of joint gaps.
   1. Application: Ceiling to ceiling & Wall to ceiling.
   2. Fire-Resistance Rating: Not less than that of adjacent construction rating.
   3. Exposed Metal:
      a. Stainless steel: ASTM A 666, Type 304, No. 4, directional satin.

2.6 MATERIALS

A. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.

B. Elastomeric Seals: Manufacturer’s standard preformed elastomeric membranes or extrusions to be installed in metal frames.

C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

D. Moisture Barrier: Manufacturer’s standard, flexible elastomeric material.

E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. Run grain of directional finishes with long dimension of each piece.
   2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   3. Directional Satin Finish: No. 4.
2.8 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

   1. Provide at first floor slab.

B. Manufacturer's stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

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

3.2 PREPARATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

   1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.

   2. Install frames in continuous contact with adjacent surfaces.

      a. Shimming is not permitted.
3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
   1. Provide in continuous lengths for straight sections.
   2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
   3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
   1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION 07 95 13.13
SECTION 07 95 13.16

EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 exterior building expansion joint cover assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.

2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

D. Samples for Initial Selection: For each type of exposed finish.

1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.

E. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

F. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:

1. Manufacturer and model number for each expansion joint cover assembly.
2. Expansion joint cover assembly location cross-referenced to Drawings.
3. Nominal, minimum, and maximum joint width.
4. Movement direction.
5. Materials, colors, and finishes.
6. Product options.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Windstorm Performance: Expansion joint cover assemblies shall be installed to withstand the effects of wind. See Section 01 45 00 for wind loads and additional requirements.

B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.
1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.

C. Expansion Joint Design Criteria:

1. Type of Movement: Thermal & Soil.
   a. Nominal Joint Width: As indicated on Drawings.
   b. Minimum Joint Width: As indicated on Drawings.
   c. Maximum Joint Width: As indicated on Drawings.

2.3 EXTERIOR EXPANSION JOINT COVERS

A. Exterior Metal-Plate Joint Cover: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.
   1. Application: Wall to wall, Wall to soffit & Soffit to soffit.
   2. Installation: Surface mounted.
   3. Fire-Resistance Rating: Not less than that of adjacent construction.
   4. Exposed Metal:
      a. Aluminum: Color anodic, Class I.
         1) Color: Dark bronze.

B. Exterior Elastomeric-Seal Joint Cover: Assembly consisting of elastomeric seal anchored to surface-mounted frames fixed to sides of joint gap.
   1. Application: Wall to wall, Wall to soffit, & Soffit to soffit.
   2. Installation: Surface-mounted.
   3. Fire-Resistance Rating: Not less than that of adjacent construction.
   4. Exposed Metal:
      a. Aluminum: Color anodic, Class I.
         1) Color: Dark bronze.
      5. Seal: Preformed elastomeric membrane or extrusion.
         a. Color: As selected by Architect from manufacturer's full range.

2.4 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
B. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.


D. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C23000 red brass for plates.

E. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

G. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

2.5 ALUMINUM FINISHES

A. Mill finish.

B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. Run grain of directional finishes with long dimension of each piece.
   2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   3. Directional Satin Finish: No. 4.

C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

2.7 COPPER-ALLOY FINISHES

A. Buffed Finish: M21 (Mechanical Finish: buffed, smooth specular).

B. Medium-Satin Finish: M32 (Mechanical Finish: directionally textured, medium satin).
2.8 ACCESSORIES

A. Moisture Barriers: Manufacturer’s standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

   1. Provide where indicated on Drawings.

B. Manufacturer’s stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

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

3.2 PREPARATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

   1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
   3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Install frames in continuous contact with adjacent surfaces.
   a. Shimming is not permitted.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
   1. Provide in continuous lengths for straight sections.
   2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
   3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
   1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections.

END OF SECTION 07 95 13.16
SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes hollow-metal work.
B. Related Requirements:
   1. Section 014500 "Windstorm Construction Requirements" for all exterior hollow-metal doors and frames manufactured to meet structural & anchoring requirements.
   2. Section 087100 "Door Hardware for door hardware for hollow-metal doors.

1.3 DEFINITIONS
A. Minimum Thickness: Minimum thickness of base metal without coatings according to SDI A250.8.

1.4 COORDINATION
A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
B. Shop Drawings: Include the following:
   1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Documentation indicating approved material and assemblies for Windstorm Construction meeting Texas Department of Insurance requirements.
5. Locations of reinforcement and preparations for hardware.
6. Details of each different wall opening condition.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.
10. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld International, LLC.
2. **Ceco Door; ASSA ABLOY.**
3. **Curries Company; ASSA ABLOY.**
4. **Pioneer Industries, Inc.**
5. **Republic Doors and Frames.**
6. **Steelcraft; an Allegion brand.**

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 **REGULATORY REQUIREMENTS**

A. **Fire-Rated Assemblies:** Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 **INTERIOR DOORS AND FRAMES**

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. **Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.**

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches
   c. Face: Cold rolled steel sheet, minimum thickness of 0.053 inch.
   d. Edge Construction: Model 1, Full Flush
   e. Core: Manufacturer's polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
3. Frames:
   a. Materials: Cold rolled steel sheet, minimum thickness of 0.053 inch.
   b. Construction: Face welded ground smooth.
2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, Windstorm Construction requirements and as specified.


1. Physical Performance: Level A according to SDI A250.4.
2. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
   d. Edge Construction: Model 1, Full Flush
   e. Retain either "Core" Subparagraph below. Unless otherwise specified, SDI A250.8 permits manufacturers to choose core types.
   f. Core: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, or vertical steel-stiffener core at manufacturer's discretion.
      1) Thermal-Rated Doors: Provide doors fabricated with thermal resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C1363.

3. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
   b. Construction: Face welded.


2.5 BORROWED LITES

A. Hollow-metal frames of uncoated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Face welded ground smooth.

2.6 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
2.7 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Glazing: Comply with requirements in Section 088000 "Glazing."

2.8 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Fire Door Cores: As required to provide fire-protection ratings indicated.

2. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.

3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.

4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.

5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
6. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
5. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
      1) Two anchors per jamb up to 60 inches high.
      2) Three anchors per jamb from 60 to 90 inches high.
      3) Four anchors per jamb from 90 to 120 inches high.
      4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches.
      5) Additional anchors as required for tested TDI assemblies for windstorm compliance.
   
   b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      1) Three anchors per jamb up to 60 inches high.
      2) Four anchors per jamb from 60 to 90 inches high.
      3) Five anchors per jamb from 90 to 120 inches high.
      4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches.
      5) Additional anchors as required for tested TDI assemblies for windstorm compliance.

6. Head Anchors: As required for TDI assemblies
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4. Provide loose stops and moldings on inside of hollow-metal work.
   5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

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 the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. All exterior frames shall be installed to meet windstorm construction requirements for the state of Texas.

C. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. At fire-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

D. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:
   a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus 0” or minus 1/32 inch.
   c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch or as required for TDI tested assemblies or handicap requirements.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

E. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13
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. Solid-core doors with plastic-laminate faces.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.
2. Section 099123 "Interior Painting" for field finishing doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Doors to be factory finished and finish requirements.
6. Fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

   a. Provide Samples for each species of veneer and solid lumber required.
b. Provide Samples for each color, texture, and pattern of plastic laminate required.

3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags and wrap bundles of doors in plastic sheeting.

C. Mark each door on top rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Algoma Hardwoods, Inc.
2. Graham Wood Doors.
3. Haley Brothers, Inc.
5. Mohawk Doors
6. Oshkosh Door Company.
7. VT Industries

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards."
1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade: Heavy Duty.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: In non-sprinkled buildings provide at vertical exit enclosures passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 C) above ambient after 30 minutes of standard fire-test exposure.
3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784. Provide at all doors in corridors smoke barrier and smoke partitions.

E. Particleboard-Core Doors:
   1. Basis-of-Design: Marshfield DPC.
   2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

F. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolt hardware.
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 PLASTIC-LAMINATE-FACED DOORS

A. Interior Solid-Core Doors:
   1. Grade: Custom.
   2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
   5. Core: Particleboard.
   6. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.

2.4 LIGHT FRAMES

A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; with baked-enamel- or powder-coated 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. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.
   1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:
   1. Grade: Custom.
   2. Finish: AWI’s, AWMAC’s, and WI’s “Architectural Woodwork Standards” Door manufacturers standard finishing process.
   3. Staining: As selected by Architect from manufacturer’s full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

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

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer’s written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16
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. Access doors and frames for walls and ceilings.

B. Related Requirements:
   1. Section 233300 "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. 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 according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. JL Industries, Inc.; a division of the Activar Construction Products Group.
2. Larsens Manufacturing Company.
3. Milcor; Commercial Products Group of Hart & Cooley, Inc.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Concealed Flanges:

2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
3. Locations: Wall and ceiling.
4. Door Size: Walls – 14” x 14”.
5. Material for Door: 16 gage.
7. Secure Treatment Rooms & Patient Toilet adjacent to Secure Treatment Room.

D. Multi-Purpose Flush Stainless Steel Access Panel

1. Basis-of-Design Product: JL Industries, Inc. TMS
2. Assembly Description: 16 Gauge stainless steel with 1” flange frame, 16 gauge stainless steel door mounted with 90 degree continuous, concealed hinge, gasketed.
4. Lock: Flush screwdriver – operated Cam (C).
5. Size: Walls – 14” x 14”, Ceilings 24” x 24”.
6. Locations: Trauma, Toilets in clinical area (Expect next to Secure Treatment Room) and Decontamination spaces.

E. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Basis-of-Design Product: Milcor, UFR DW, 14” x 14”.
2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
3. Locations: Wall.
4. Fire-Resistance Rating: Not less than 1 hour.
5. Material for Door: Nominal 0.040 inch, 20 gage.
6. Stainless-Steel Sheet Door: Nominal 16 gage, NO. 4 finish.
   a. Standard Finish at Soiled Utility.
7. Frame Material: 16 gage.
8. Hinges: Manufacturer’s standard.
9. Hardware: Latch.

F. Hardware:

1. Latch: Cam latch
2. Lock: Cylinder, keyed alike.

2.3 MATERIALS

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

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

C. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.

D. Frame Anchors: Same type as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 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. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

E. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finish: No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
a. Run grain of directional finishes with long dimension of each piece.

b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

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 08 31 13**
SECTION 08 31 14

DRYWALL CEILING ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes factory-molded, drywall ceiling access door fabrications for interior ceiling applications at gypsum board ceilings at General Waiting, ADA Public Toilets, Registration, Team Work Spaces, and all gypsum board furring for access to values above the ceiling.
   B. Related Requirements:
      1. Section 08 31 13 "Access Doors and Frames" for locations of metal painted and stainless steel finished access doors.
      2. Section 09 22 16 "Non-Structural Metal Framing" for steel framing, blocking, and bracing supporting drywall ceiling access doors.
      3. Section 09 29 00 "Gypsum Board" for tapping and bedding access doors into gypsum board ceilings.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product. Include construction details, material descriptions, weights, dimensions of individual components and profiles, and finishes.
   B. Samples: For each door face material, at least 8 by 8 inches (203 by 203 mm) in size, in specified finish.
   C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, and other data pertinent to installation.

1.3 INFORMATIONAL SUBMITTALS
   A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
      1. Ceiling suspension assembly members.
      2. Method of attaching hangers to glass-fiber-reinforced plaster fabrications and to building structure.
      3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, moldings, and other fixtures.

1.4 FIELD CONDITIONS
   A. Environmental Conditions:
      1. Do not deliver or install drywall ceiling access panel fabrications until building is enclosed, wet work is complete, and HVAC system is operating and continuously maintaining temperature and relative humidity at levels intended for building occupants.
PART 2 - PRODUCTS

2.1 ACCESS DOORS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. InterSource Specialties Co. (ISC).
2. Substitutions: Under provisions of Section 01 33 00.
B. Size: 16" x 16".
C. Locations: Furring at Corridors, Reception, Team Work spaces.

2.2 MATERIALS:
A. Glass Reinforced Gypsum (G.R.G.) units shall be prefabricated with high density gypsum, completely free of both asbestos and resin, reinforced with continuous filament random glass-fiber mat. Chopped strand fiber reinforcing is not permitted.
1. No additives are allowed under any circumstances. These include: polymers, retarders, accelerators, etc. The architect or his representative shall have access to the manufacturing facilities, either prior to contract award or thereafter, to inspect or verify compliance with these specifications.

2.3 FABRICATION
A. Tolerances:
1. Dimensional all directions +/- 1/8" +/- 3.2mm
2. Thickness skin +/- 1/16" / - 0" +/- 1.6mm
3. Thickness - total unit +/- 1/8" +/- 3.2mm
4. Warpage or bowing +/- 1/6" per foot +/- 1.6mm per 304.8mm
B. Physical Properties:
1. Shell Thickness 1/8" to 3/16" 3.2mm to 4.8mm
2. Weight (depending on reinforcing)1 - 2 lbs/sq.ft 4.9 to 9.8kg/m2
3. Density 110 lbs/ft3 1 750 kg/m
4. Ultimate Tensile Strength 1200 - 1400 p.s.i. 8275.9 - 9655 kPa
5. Mod. of Elasticity in Tension 2.7 - .8 x 106 p.s.i. 26200 Mpa
6. Mod. of Elasticity in Flexure 2.1 - 2.2 x 105 p.s.i 1516.8 Mpa
7. Impact Strength 8.0 - 8.8 ft.lbs./in. 2 55.2 to 60.7 kPa
8. Hardness - Rockwell M72 M72
9. Impact Strength 8.0 - 8.8 ft.lbs./in. 2 55.2 to 60.7 kPa
10. Instron Failure Test (built in hanger) 288 lbs. (min.) 131 kg. (min.)
11. Max. length of mouldings 4'-.0" 1220 mm
12. Flame Spread, Smoke Index & Fuel Contribution (A.S.T.M. E84-80) - 0

2.4 AUXILIARY MATERIALS
A. Adhesives: As recommended by manufacturer’s written instructions and as follows:
1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
B. Steel Drill Screws: Of sufficient length and size to securely fasten glass-fiber-reinforced plaster fabrications to framing members, and as follows:
   1. Screws complying with ASTM C 1002 for fastening glass-fiber-reinforced plaster fabrications to steel members less than 0.033 inch (0.84 mm) thick.

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

3.2 INSTALLATION
   A. Units shall be lifted carefully with suitable devices and installed plumb and level.
   B. Fasten units with screws (through the face or from the back), bolting or welding as shown on the shop drawings. Where units are suspended, use as a minimum, the suspension points indicated on the shop drawings.
   C. Butt joints are to be glued together.
   D. Use joint-treatment materials to finish glass-fiber-reinforced plaster fabrications to produce surfaces ready to receive primers and paint finishes specified in Section 09 91 00 "Painting."
      1. Finish joints between units, and countersunk fastener heads to comply with ASTM C 840 for Level 4 and to match surface texture of units.

3.3 INSPECT /ADJUST
   A. Repair hollows, voids, scratches, and other surface imperfections on units.
   B. Adjust doors, after installation, for proper operation.

END OF SECTION 08 31 14
SECTION 08 33 00
ROLLING SHUTTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Electric operated rolling counter doors

B. Related Sections:
   1. 05 50 00 Metal Fabrications. Door opening jamb and head members
   2. 06 10 53 Miscellaneous Rough Carpentry. Door opening jamb and head members
   3. 08 31 00 Access Doors and Panels. Access doors
   4. 08 71 00 Hardware. Master keyed cylinder
   5. 09 91 00 Painting. Field painting
   6. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring

C. Products That May Be Supplied, But Are Not Installed Under This Section:
   1. Control Station

1.2 SUBMITTALS

A. Reference Section 01 33 00 Submittal Procedures; submit the following items:
   1. Product Data
   2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
   3. Quality Assurance/Control Submittals:
      a. Provide manufacturer ISO 9001:2015 registration
      b. Provide manufacturer and installer qualifications - see below
      c. Provide manufacturer's installation instructions
   4. Closeout Submittals:
      a. Operation and Maintenance Manual
      b. Certificate stating that installed materials comply with this specification

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five years experience in producing counter doors of the type specified
   2. Installer Qualifications: Manufacturer’s approval

1.4 DELIVERY STORAGE AND HANDLING
A. Follow manufacturer’s instructions.

1.5 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for owner’s consideration and acceptance of a maintenance service agreement for installed products.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer:
   1. Cookson: 1901 South Litchfield Road, Goodyear, AZ 85338. Telephone: (800) 294-4358.
   2. Cornell
   3. Clopay Building Products

2.2 PRODUCT INFORMATION

A. Basis-of-Design: Cookson Model: ESC10

2.3 MATERIALS

A. Curtain:
   1. Slat Configuration:
      a. Stainless Steel: No. 1F, interlocked flat-faced slats, 1-1/2 inches (38 mm) high by 1/2 inch (13 mm) deep, minimum 22 gauge AISI type 304 #4 finish stainless steel with stainless steel angle bottom bar with lift handles and vinyl astragal
   2. Finish:
      a. Stainless Steel: type 304 #4 finish

B. Endlocks:
   Fabricate interlocking slat sections with high strength molded nylon endlocks riveted to ends of alternate slats

C. Guides:
   1. Fabrication:
      a. Stainless Steel: 12 gauge formed shapes
   2. Finish:
      a. Stainless Steel: type 304 #4 finish
D.    Shaft Assembly:
    1.    Tube Motor Shaft Assembly:
        a.    Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width

E.    Brackets:
Fabricate from reinforced steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures
1.    Finish:
        a.    Standard (Stock Colors): Zirconium treatment followed by a tan baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness

F.    Hood:
Minimum 24 gauge stainless steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets.
1.    Finish:
        a.    No hood provided when coil is above ceiling

2.4    OPERATION

    A.    Motor Operation:
    1.    Electric Tube Motor Operator: Rated for a maximum of 10 cycles per day, cULus recognized, rated (50nm) (100nm) or (200nm) as recommended by door manufacturer for size and type of door, 110 Volts, 1 Phase. Provide complete with electric tube motor, maintenance free electric brake, emergency manual crank hoist and control station(s). Motor shall be protected against overload with an auto-reset thermal sensing device. Operator shall be equipped with an emergency manual crank hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual crank hoist. Operator shall be capable of 10-14 RPM. Fully adjustable, mechanical internal worm limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

    B.    Control Station: For use with motor operated units only
    1.    Flush mounted: "Open/Close" key switch with "Stop" push button; NEMA 1B.

    C.    Control Operation:
    1.    Constant pressure to close:
        a.    2-wire, electric sensing edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a connection to control circuit.

2.5    ACCESSORIES

    ROLLING SHUTTER DOORS
    08 33 00- 3
A. Locking:
   1. None

B. Countertop:
   1. Stainless steel 14 gauge type 304 #4 finish: “T” shaped design for face of wall mounted unit or rectangular shape design for between jambs mounted unit of size and configuration for opening size and wall construction. See plan for configuration.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION
A. Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.
B. Follow manufacturer's installation instructions.

3.3 ADJUSTING
A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 CLEANING
A. Clean surfaces soiled by work as recommended by manufacturer.
B. Remove surplus materials and debris from the site.

3.5 DEMONSTRATION
A. Demonstrate proper operation to Owner's Representative.
B. Instruct Owner's Representative in maintenance procedures.
END OF SECTION 08 33 00
SECTION 08 41 10
ALUMINUM-FRAMED STOREFRONTS - EXTERIOR

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.

B. Section Includes:
1. Storefront system, complete with reinforcing, fasteners, anchors, and attachment devices.
2. Accessories necessary to complete work.

C. Products Furnished But Not Installed Under This Section:
1. Anchoring devices which are built into masonry.

D. Related Sections:
1. Section 01 45 00 – Windstorm Construction Requirements.
2. Section 05 50 00 - Metal Fabrications.
3. Section 06 10 53 - Rough Carpentry.
4. Section 07 92 00 - Joint Sealers.
5. Section 08 71 00 - Door Hardware.
6. Section 08 80 00 - Glass and Glazing.

1.2 REFERENCES

A. Aluminum Association (AA):
1. DAF-45 Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA):
1. 501.2 Field Check of Metal Curtain Walls for Water Leakage.
5. 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
6. 701.2 Specifications for Pile Weatherstripping.
7. Manual #10 Care and Handling of Architectural Aluminum from Shop to Site.
8. SFM1 Aluminum Storefront and Entrance Manual.

C. American National Standards Institute (ANSI):
1. A117.1 Safety Standards for the Handicapped.

D. American Society for Testing and Materials (ASTM):
   1. A36 Structural Steel.

E. Federal Specifications (FS):
   1. TT-P-641G(1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
   2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

F. Steel Structures Painting Council (SSPC):
   1. Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
   2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
   3. Provide concealed fastening.
   4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
   5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
   7. Where anchor inspections are required, sill design with appropriate access will be provided.
   8. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.

B. Performance Requirements:
1. Air infiltration: Tested in accordance with Miami – Dade County and Florida Building Code HVHZ (TAS-202) and ASTM E 283 at differential static pressure of 6.24 psf.

2. Water infiltration: No uncontrolled leakage when tested in accordance with Miami – Dade County and Florida Building Code HVHZ (TAS-202) and ASTM E331 at test pressure of 15 psf.

C. Hurricane Resistance Requirements
1. Large Missile Impact per Miami – Dade County Building Code Compliance Office (BCCO) and Florida Building Code HVHZ (TAS-201) and (ASTM E 1886/1996) test requirements.
2. Cyclic Load Test per Miami – Dade County Building Code Compliance Office (BCCO) protocol (PA-203), Florida Building Code HVHZ (TAS-203) and (ASTM E 1886/1996) test requirements.
3. Uniform Static Load Test per Dade – County Building Code Compliance Office (BCCO) and Florida Building Code HVHZ (TAS-202) and ASTM E 330.
4. See Section 01 45 00 Windstorm Construction Requirements for wind load requirements. Installation of units shall be in accordance with Product Evaluation CWSF-18, effective March 1, 2016 from Texas Department of Insurance.

D. Structural Requirements, as measured in accordance with ANSI/ASTM E330:
1. Wind loads for exterior assemblies:
   a. Basic loading:
      1) +70 Maximum psf acting inward for FG-5100 Wet-Glazed Option
      2) -80 Maximum psf acting outward for FG-5100 Wet-Glazed Option
      3) +70 Maximum psf acting inward for FG-5100 Dry-Glaze Option
      4) -70 Maximum psf acting outward for FG-5100 Dry-Glaze Option
   b. See Section 014500 Windstorm Construction Requirements and Structural General Notes for project specific minimum requirements.

E. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures shall be limited to L/180 of its clear span.

F. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory certified by Miami – Dade County Building Code Compliance Office (BCCO), Florida Building Code (FBC) and ASTM.

1.4 SUBMITTALS
A. General: Submit in accordance with Section 01 33 00.

B. Product Data:
1. Submit manufacturer’s descriptive literature and product specifications.
2. Include information for factory finishes, hardware, accessories, and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for selection.
4. Documentation indicating compliance with Texas Windstorm Association product evaluation.

C. Shop Drawings:
1. Submit shop drawings covering fabrication, installation and finish of specified systems.
2. Include following:
   a. Fully dimensioned plans and elevations with detail coordination keys.
   b. Locations of exposed fasteners and joints.
3. Provide detailed drawings of:
   a. Composite members.
   b. Joint connections for framing systems and for entrance doors.
   c. Anchorage size and spacing.
   d. System reinforcements.
   e. System expansion and contraction provisions.
   f. Glazing methods and accessories.
   g. Internal sealant requirements.
4. Schedule of finishes.

D. Samples:
1. Submit manufacturers’ standard samples indicating quality of finish.
2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
3. Submit samples for each type of glass, 12 x 12 inch size.

E. Test Reports:
1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.

F. Qualification Data:
1. Submit installer qualifications verifying years of experience.

Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility:
1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

C. Perform Work in accordance with AAMA SFM1 and manufacturer's written instructions.

D. Conform to requirements of ANSI A117.1 and local amendments.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Protect finished surfaces as necessary to prevent damage.

B. Do not use adhesive papers or sprayed coatings, which become firmly bonded when exposed to sun.

C. Do not leave coating residue on any surfaces.

D. Replace damaged units.

1.7 WARRANTY

A. Provide warranties in accordance with Section 01 77 00.

B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 2 year from date of Substantial Completion.

C. Warranty shall cover following:
   1. Complete watertight and airtight system installation within specified tolerances.
   2. System is structurally sound and free from distortion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Subject to compliance with requirements indicated, provide products by one of the following:
   1. Oldcastle Building Envelope®, Terrell, TX.

B. Substitutions: Submit under provisions of Section 013300, a minimum of 10 days prior to bid date.

C. Acceptable Storefront Framing Systems:

   Flush Glazed System, center set, exterior loaded:
   Series 5100 – 2 ½” x 5” mullion profile; accommodates up to 1-5/16” laminated glass unit. Option “A” or “B” below will be dependent on windstorm load requirements.
   1. Option “A” Wet-Glazed system.
   2. Option “B” Dry-Glazed or Fully Gasketed Option

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
   1. ASTM B221, alloy 6063-T6 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by
manufacturer appropriate for specified finish.
2. Minimum thickness of 0.080 inch for main framing members.

B. Internal Reinforcing:
1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
2. (1 ¼” x 4 9/16” x ¼”) steel channel (vertical mullions) and (1 ¼” x 4 11/16” x 12 ga) steel channel (vertical jambs).
3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:
1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
2. Provide concealed fasteners wherever possible.
3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
4. For concealed locations, provide manufacturer's standard fasteners.

D. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

E. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

F. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.

G. Glazing Gaskets:
1. Compression type design, replaceable extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM) at exterior gasket. Profile and hardness as required to maintain uniform pressure for watertight seal.
2. Dow – Corning #795 structural silicone sealant at interior gasket with Norton “V-2110” SSA spacer tape.

I. Weatherstripping:
1. Provide D-1913 EPDM fin seal in AS-6 adjustable astragal.
2. Provide D-174 silicone weatherstripping in bottom door rail.

J. Internal Sealants and Sealant Tapes.

2.3 GLASS AND GLAZING ACCESSORIES

A. Refer to Section 08 80 00.
2.4 FABRICATION

A. Coordination of Fabrication:
   1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
   2. Fabricate units to withstand loads, which will be applied when system is in place.

B. General
   1. Conceal fasteners wherever possible.
   2. Reinforce work as necessary for performance requirements, and for support to structure.
   3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
   4. Comply with Section 088000 for glazing requirements.

C. Aluminum Framing:
   1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
   2. Fabricate frame assemblies with joints straight and tight fitting.
   3. Reinforce internally with structural members as necessary to support design loads.
   4. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
   5. Seal horizontals and direct moisture accumulation to exterior.
   6. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
   7. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.
   8. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and FGMA Glazing Manual.

D. Welding:
   2. Use recommended electrodes and methods to avoid distortion and discoloration.
   3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

E. Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oil canning".

2.5 FINISHES

A. Clear Anodized:
   2. Architectural Class II, etched, medium matte, clear anodic coating,
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work upon acceptance of acceptable conditions.

3.2 INSTALLATION

A. Erection Tolerances:
   1. Limit variations from plumb and level:
      a. 1/8 inch in 10'-0" vertically.
      b. 1/8 inch in 20'-0" horizontally.
   2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
   3. Limit offsets in theoretical end-to-end and edge-to-edge alignment:
      1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

B. Install doors and hardware in accordance with manufacturer's printed instructions.

C. Set units plumb, level and true to line, without warp or rack of frame.

D. Anchor securely in place, allowing for required movement, including expansion and contraction.

E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.

G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07 92 00.

H. Glazing: Refer to requirements of Section 08 80 00.

3.3 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer’s instructions to ensure smooth operation.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 08 41 10
SECTION 08 41 13
ALUMINUM STOREFRONTS - INTERIOR

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.

B. Section Includes:
1. Storefront system, complete with reinforcing, fasteners, anchors, and attachment devices.
2. Accessories necessary to complete work.

C. Products Furnished But Not Installed Under This Section:
1. Anchoring devices which are cast in concrete.

D. Related Sections:
1. Section 05 50 00 - Metal Fabrications.
2. Section 06 10 53 - Rough Carpentry.
3. Section 07 92 00 - Joint Sealers.
4. Section 08 71 00 - Door Hardware.
5. Section 08 80 00 - Glass and Glazing.

1.2 REFERENCES

A. Aluminum Association (AA):
1. DAF-45 Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA):
1. 501 Methods of Test for Exterior Walls.
2. 501.2 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
5. 701 Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
6. CW-10 Care and Handling of Architectural Aluminum From Shop to Site.
7. SFM1 Aluminum Storefront and Entrance Manual.

C. American Society for Testing and Materials (ASTM):
1. A36 Structural Steel.
2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel
3. **B209** Aluminum and Aluminum - Alloy Sheet and Plate.
4. **B221** Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
5. **E283** Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
7. **E331** Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

D. **Glass Association of North America (GANA):**

E. **Federal Specifications (FS):**
   1. **TT-P-641G(1)** Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
   2. **TT-P-645A** Primer, Paint, Zinc Chromate, Alkyd Type.

F. **Steel Structures Painting Council (SSPC):**
   1. Cold-Applied Asphalt Mastic (Extra Thick Film).

1.3 **SYSTEM REQUIREMENTS**

A. **Design Requirements:**
   1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
   2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
   3. Provide concealed fastening.
   4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
   5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   6. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
   7. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.

B. **Performance Requirements:**
   2. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.06 cfm per square foot of surface area when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
   3. Water infiltration: No uncontrolled leakage when tested in accordance with
ASTM E331 at test pressure of 10 psf as defined in AAMA 501.

4. Deflection:
Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures for spans up to and including 13'-6" shall be limited to 1/175 of its clear span and for spans greater than 13'-6" deflection shall be limited to 1/240 of its clear span + 1/4", except that maximum deflection of members supporting plaster surfaces shall not exceed 1/360 of its span.

C. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Product Data:
   1. Submit manufacturer's descriptive literature and product specifications.
   2. Include information for factory finishes, hardware, accessories, and other required components.

C. Shop Drawings:
   1. Submit shop drawings covering fabrication, installation and finish of specified systems.
   2. Include following:
      a. Fully dimensioned plans and elevations with detail coordination keys.
      b. Locations of exposed fasteners and joints.
   3. Provide detailed drawings of:
      a. Composite members.
      b. Joint connections for framing systems and for entrance doors.
      c. Anchorage.
      d. System reinforcements.
      e. System expansion and contraction provisions.
      f. Glazing methods and accessories.
      g. Internal sealant requirements.
   4. Schedule of finishes.

D. Samples:
   1. Submit manufacturers standard samples indicating quality of finish.
   2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Test Reports:
   1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.

F. Qualification Data:
   1. Submit installer qualifications verifying years of experience.

0. Manufacturer's Instructions: Submit manufacturer's printed installation
1.5 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. To ensure quality of appearance and performance, obtain materials for
      systems from either a single manufacturer or from manufacturer approved
      by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for
   installation of specified systems.

C. Perform Work in accordance with AAMA SFM1 and manufacturer's written
   instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 01 60 00.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings that become firmly bonded when
   exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

1.7 WARRANTY

A. Provide warranties in accordance with Section 01 77 00.

B. Provide written warranty in form acceptable to Owner jointly signed by
   manufacturer, installer and Contractor warranting work to be watertight, free from
   defective materials, defective workmanship, glass breakage due to defective
   design, and agreeing to replace components which fail within 1 year from date of
   Substantial Completion.

C. Warranty shall cover following:
   1. Complete watertight and airtight system installation within specified
      tolerances.
   2. System is structurally sound and free from distortion.

D. Provide written warranty stating organic coating finish will be free from fading
   more than 10%, chalking, yellowing, peeling, cracking, pitting, corroding or non-
   uniformity of color, or gloss deterioration beyond manufacturer's descriptive
   standards for 1 year from date of Substantial Completion and agreeing to promptly
   correct defects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS
A. Subject to compliance with requirements indicated, provide products by one of the following:
   1. Oldcastle Building Envelope®, Terrell, TX.

B. Substitutions: Submit under provisions of Section 01 25 00, a minimum of 10 days prior to bid date.

C. Acceptable Storefront Framing System:
   Flush Glazed System, center set, exterior loaded
   Series 3000 - 2" x 4 1/2" mullion profile; accommodates 1" glazing with 1/4" as an option.

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
   1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Internal Reinforcing:
   1. ASTM A36 for carbon steel.
   2. Shapes and sizes to suit installation.
   3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:
   1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
   2. Hot-dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
   1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
   2. Provide concealed fasteners wherever possible.
   3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
   4. For concealed locations, provide manufacturer's standard fasteners.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.

H. Glazing Gaskets:
1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
2. Profile and hardness as required to maintain uniform pressure for watertight seal.

I. Weatherstripping:
   1. Wool pile conforming to AAMA 701.2.
   2. Provide EPDM or vinylblade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

J. Internal Sealants and Baffles.

2.3 GLASS AND GLAZING ACCESSORIES

A. Refer to Section 08 80 00.

2.4 FABRICATION

A. Coordination of Fabrication:
   1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
   2. Fabricate units to withstand loads that will be applied when system is in place.

B. General
   1. Conceal fasteners wherever possible.
   2. Reinforce work as necessary for performance requirements, and for support to structure.
   3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
   4. Comply with Section 08 80 00 for glazing requirements.

C. Aluminum Framing:
   1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
   2. Fabricate frame assemblies with joints straight and tight fitting.
   3. Reinforce internally with structural members as necessary to support design loads.
   4. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
   5. Seal horizontals and direct moisture accumulation to exterior.
   6. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
   7. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.

D. Welding:
   2. Use recommended electrodes and methods to avoid distortion and
3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

E. Flashings: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

2.5 FINISHES

A. Clear Anodized:
1. Conforming to AA-M12C22A31 and AAMA 611.
2. Architectural Class II, etched, medium matte, clear anodic coating, 0.4 mil minimum thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 01400.

3.2 INSTALLATION

A. Erection Tolerances:
1. Limit variations from plumb and level:
   a. 1/8 inch in 10'-0" vertically.
   b. 1/8 inch in 20'-0" horizontally.
2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

B. Install doors and hardware in accordance with manufacturer's printed instructions.

C. Set units plumb, level and true to line, without warp or rack of frame.

D. Anchor securely in place, allowing for required movement, including expansion and contraction.

E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07 92 00.

H. Glazing: Refer to requirements of Section 08 80 00.
3.3 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer’s instructions to ensure smooth operation.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer’s recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 08 41 13
SECTION 08 42 29.23
SLIDING AUTOMATIC ENTRANCES - EXTERIOR

PART I – GENERAL

1.1 SUMMARY

A. WORK INCLUDED: Furnish complete automatic aluminum door system, as specified, that has been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

B. RELATED WORK:
   1. Windstorm Construction Requirements: Division 01.
   2. Division 03, applicable sections.
   3. Masonry: Division 04, applicable sections.
   4. Thermal and Moisture Protection: Division 07, applicable sections.
   5. Openings: Division 08, applicable sections.
   6. Electrical: Division 26, applicable sections.

1.2 REFERENCES

A. AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA) 101: Appendix Dissimilar Materials.

B. AMERICAN ASSOCIATION OF AUTOMATIC DOOR MANUFACTURERS (AAADM).

C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):
   2. ANSI A156.10: For Power Operated Pedestrian Doors; Sliding Doors section.

D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM):
   1. ASTM B221: Aluminum-Alloy Extruded Bars, Rods, Shapes and Tubes.
   2. ASTM E330-02: Static Load Test
   3. ASTM E283-04: Air Infiltration Test


G. UNDERWRITERS LABORATORY, INC.(USA & CANADA) UL 325: Electrical Door, Drapery, Gate, Louver, and Window Operators and Systems.

H. MIAMI-DADE COUNTY BUILDING CODE COMPLIANCE OFFICE (BCCO) NOTICE OF ACCEPTANCE (NOA):
   1. No. 14-0602.05: Impact Unit - Large & Small Missile
2. No. 14-0602.06: Impact Unit - Small Missile
3. No. 14-0602.04: Non-Impact Unit

1.3 SUBMITTALS

A. PRODUCT DATA: Submit manufacturer's complete product and installation data.

B. NOA LETTER AND DRAWINGS: Submit Notice of Acceptance letter and drawings issued by Miami-Dade County Building Code Compliance Office showing layout, profiles, product components including anchorage, accessories and glazing details. Note: Any deviation from NOA letters and drawings voids compliance of Horton product with Miami-Dade County Building Code Compliance Office. Letters and drawings must be kept as complete set to meet compliance.

C. QUALITY ASSURANCE AND CLOSEOUT SUBMITTALS: Submit the following:
   1. Manufacturer's Operation and Maintenance Data.
   2. Warranty document as specified herein.
   3. AAADM inspection compliance form completed and signed by certified AAADM inspector prior to doors being placed in operation as proof of compliance with ANSI A156.10.

1.4 QUALITY ASSURANCE AND PERFORMANCE REQUIREMENTS

A. INSTALLERS QUALIFICATIONS: Installer shall be factory trained, certified by AAADM, and experienced to perform work of this section.

B. MANUFACTURER’S QUALIFICATIONS: Manufacturer to have minimum (5) five years successful experience in the fabrication of automatic doors of the type required for this project. Manufacturer capable of providing field service representation during installation, approving acceptable installer and approving application method.

C. NOA LETTER AND DRAWINGS: Submit Notice of Acceptance letter and drawings issued by BCCO showing layout, profiles, product components including anchorage, accessories and glazing details. Note: Any deviation from NOA letters and drawings voids compliance of Horton product with Miami-Dade County Building Code Compliance Office. Letters and drawings must be kept as complete set to meet compliance. See Section 014500 for additional requirements for Windstorm Construction, design loads, and submittals.

D. CERTIFICATIONS: Automatic sliding door systems and options shall be factory certified to meet performance design criteria in accordance with the following standards:
   1. ANSI A156.10: For Power Operated Pedestrian Doors; Sliding Doors section.
   3. UL 325: Electrical Door, Drapery, Gate, Louver, and Window Operators and Systems.
   4. BOCA: Means of Egress, Power Operated Doors
   5. ICBO/UBC: Egress Through Lobbies
   6. ICC/IBC: Egress Section

E. OPERATING RANGE: -30° F to 130° F (-34° C to 54° C).
F. OPENING FORCE REQUIREMENTS FOR EMERGENCY EGRESS:
   1. Slide-swing panels shall require no more than 50 lbf. (222 N) of force to swing open. Slide-swing panels shall be capable of swinging out 90° from any position of slide movement.
   2. Slide-swing panels and swing-out sidelites shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
   3. If power fails, slide panels can be manually slid open with no more than 15 lbf (222 N) of force.
   4. Units are UL listed as an exit way and are compliant with NFPA 101.

G. CLOSING FORCE REQUIREMENTS: Maximum force required to prevent sliding panel from closing = 28 lbf. (124.5 N) Adjustable Reversing Circuit will reopen door unit if closing path is obstructed.

H. HEADER CAPACITY: Header shall be capable of supporting:
   1. Bi-parting: Up to 250 lbs. (113.4 kg) per slide panel over spans up to 16’-0” (4877mm) without intermediate supports.

1.5 WARRANTIES

A. MANUFACTURER'S WARRANTY: Units to be warranted against defect in material and workmanship for a period of five year from the Date of Substantial Completion. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.

B. DISTRIBUTOR'S WARRANTY: Five year warranty: Labor & transportation charges for defective parts replacement.

1.6 PROJECT CONDITIONS

FIELD MEASUREMENTS: Verify actual dimensions/openings by field measurements before fabrication and record on shop drawings. Coordinate with fabrication and construction schedule to avoid construction delays.

1.7 DELIVERY, STORAGE AND HANDLING

A. ORDERING AND DELIVERY: Comply with factory's ordering instructions and lead time requirements. Delivery shall be in factory's original, unopened, undamaged containers with identification labels intact.

B. STORAGE AND PROTECTION: Provide protection from exposure to harmful weather conditions and vandalism.

PART II – PRODUCTS

2.1 MANUFACTURER

HORTON AUTOMATICS, a division of Overhead Door Corporation, shall manufacture automatic sliding door(s) of type(s) and size(s) specified on plans and door schedule.
2.2 EQUIPMENT

A. MANUFACTURED DOOR UNITS: Shall include operator, header and track, jambs, sliding door panel(s), and sidelite(s). Units to be mounted within rough opening. Units will be either single-slide or bipart and will be one of the following type:
   1. Type 310: Slide-swing panel(s) ‘SX’ slides along interior side of swing-out sidelite(s) ‘SO’.

B. WIND LOAD RATING: Units will be either:
   1. Wind Load: ±55 PSF without Exit Device
   2. Wind Load: ±45 PSF with Exit Device

C. OPERATOR: Shall be mounted and concealed within the aluminum header. Maximum current draw shall not exceed 3.15 amps. Units will be either:
   1. The standard operator shall be the Profiler® Series 2000 Linear Drive electric operating mechanism. Operation shall be accomplished through a 1/8 HP DC permanent magnet working with a threadless, induction hardened stainless steel 1/2" (13 mm) diameter linear drive shaft. A linear travel block describes a helical path along the rotating shaft utilizing six aircraft quality ball bearings acting as an integral clutch. Linear drive shaft shall be self lubricating by means of integral oiler located in the travel block.
      a. Optional operator shall be the Profiler® Series 2000B Elite Belt Drive electric operating mechanism. Operating force shall be accomplished through a 1/8 HP DC permanent magnet motor with worm gear transmission and 1800 RPM working with drive belt, attached door hangers, and idler pulley. Drive belt to be steel reinforced nylon, 1/2" (13 mm) wide. Idler pulley to be reinforced, metallic material.
   2. Master Control shall be 16 bit microprocessor controller with dual on-board seven-segment alphanumeric diagnostic display and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed. The control shall have minimum of 28 programmable parameters including the following functions as required by ANSI A156.10:
      a. Adjustable opening and closing speeds.
      b. Adjustable back-check and latching.
      c. Adjustable braking.
      d. Adjustable hold-open time between 1 to 30 seconds.
      e. Adjustable Reversing Circuit will reopen door unit if closing path is obstructed.
      f. Separate day and night modes of operation with security over-ride.
   3. Finger Safety: When unit slides open, strike rail of sliding panel will stop short of adjacent sidelite; resulting opening is net slide.
   4. On/Off Switch shall be supplied. When switched OFF, unit reverts to free manual operation (likewise during electrical power failure).

D. SECURITY AND SAFETY POWER FAIL OPTIONS:
   1. Automatic lock: Automatically locks slide function of door when in closed position. Additional power supply for autolock not acceptable.
      a. Autolock Fail Secure: If power fails the lock engages.
      b. Autolock Fail Safe: If power fails the lock disengages.
   2. Monitored Power Fail Options (battery back-up):
      a. Software Selectable Power Fail Open: If power fails the door slides open.
b. Software Selectable Power Fail Close: If power fails the door slides closed.

E. PROFILER® HEADER: Shall be slim 4" (102 mm) deep by 6" (152 mm) high aluminum construction with extruded z-profile reinforcement for dead load and lateral strength. Header shall have removable face plate.

F. CARRIER ASSEMBLIES AND HEADER ROLLER TRACK: Carrier assemblies shall support door panels with minimum four rollers per panel. Rollers will be steel, high quality ball bearing wheels 1-1/4" (32 mm) diameter. Anti-Derailling shall be accomplished by means of a continuous aluminum extrusion full length of slide panel travel. Overhead header roller track shall be continuous aluminum, nylon covered, and replaceable.

G. SLIDING PANEL(S) AND SIDELITE(S): Shall be aluminum, 1-3/4" (44 mm) deep with medium stile construction. Weather-stripping to be along perimeter of sliding panel(s) and swing-out sidelite(s). Concealed guides to stabilize bottom of sliding panel. Standard glazing prep to be noted on appropriate NOA drawing shall be either 1/4" glass or nominal 7/16" glass.

H. EMERGENCY EGRESS: Slide-swing panels can swing out 90° from any position of slide movement and require no more than 50 lbf. (222 N) of force applied at the lock stile to open during normal operation.
   1. Slide-swing panels and swing-out sidelites shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
   2. Breakout mechanism shall provide support across full width of the door, in normal operating mode. In breakout mode, torsion assembly shall support weight of the door to minimize drop during emergency egress.
   3. Units with emergency egress feature are UL listed as an exit way and are compliant with NFPA 101.

I. JAMBS/FRAME: Shall be aluminum. Dimensions to be 1 3/4" (44 mm) deep by 4" (102 mm) wide.

J. THRESHOLD: Shall be aluminum, 1/2" (25 mm) tall by 4" (102 mm) wide or 7" (178 mm) wide as per appropriate NOA drawing.

K. HARDWARE: Provided and installed in two locations of strike rail shall include:
   1. Maximum Security Lock with 31/32" (25 mm) backset.
   2. Lock Indicator
   3. Keyed Cylinder mounted on exterior side with 1 5/32" (29 mm) standard size cylinder.
   4. Thumbturn mounted on interior side.
   5. 3/8" Lockbolt extending 1/2" into breakout carrier frame and threshold.

L. HARDWARE OPTIONS:
   1. Cylinder Guard.
   2. Cylinder Escutcheon.
   3. Surface mounted Panic Exit Device: (door type 310 only as shown on appropriate NOA drawing).

2.3 RELATED EQUIPMENT
BASIC SENSOR SYSTEM: Shall be 24 VDC, class II circuit and shall be adjusted and installed in compliance with ANSI A156.10. System shall include the following:

A. ACTIVATION SENSORS: Microwave or active infrared sensor shall be header-mounted each side of door unit for detection of traffic from each direction.

B. THRESHOLD PRESENCE SENSORS:
   1. Header mounted sensors shall provide active infrared presence detection on each side of the door unit and shall remain active throughout the entire door opening and closing cycle.
   2. Hold-open beams: Two pulsed infrared photoelectric beams to be mounted in vertical rails of sidelite or in jambs. Sender/receiver arrangement parallels door opening.

2.4 RELATED WORK REQUIREMENTS

A. ELECTRICAL: 120 VAC, 50/60 cycle, single phase, dedicated 20 amp circuit per operator.

B. GLASS AND GLAZING: Glass stops, glazing vinyl and setting blocks for field glazing as per Safety Glazing standard ANSI Z97.1.2. Contractor to coordinate acquisition of glass in thickness and type in accordance with manufacturer's recommendations for prescribed design.

2.5 MATERIALS, FINISHES AND FABRICATION

A. EXTRUDED ALUMINUM: ASTM B221, 6063-T5 alloy and temper, anodized:
   1. Structural Header Sections: Minimum 3/16" (5 mm) thickness.
   2. Structural Frame Sections: Minimum 1/8" (3 mm) thickness.
   3. Structural Panel Sections: Minimum 1/8" (3 mm) thickness.

B. FINISHES (for all exposed aluminum surfaces): Shall be one of the following:
   1. 204-R1 Clear: Arch. Class 2 Clear Anodized Coating, AA-M12C22A31.
   2. 313-R1 Dark Bronze: Arch. Class 1 Anodized Coating, AA-M12C22A44.
   3. See door schedule for locations of finishes.

C. PANEL CONSTRUCTION:
   1. Corner block type with 3/16” steel backup plate construction, mechanically secured with minimum of four hardened steel screws and threaded rod reinforcement. Vertical rails to have reinforcing A36 steel backup tube: 1” square x 1/8”, full length of vertical rail. Sash consists of snap-in glass stops, snap-in glazing beads and vinyl gaskets.
   2. Weatherstripping material captured in extruded aluminum door panel. Door nosing weatherstrip to be spring-loaded adjustable astragal type. Surface applied self-adhesive weatherstripping not acceptable.
   3. Slide-swing doors to be supplied with adjustable glass setting block to allow for adjusting of door to meet site conditions eliminating the need for additional shims.

D. FRAME CONSTRUCTION: Butt joints, mechanically secured by means of screws and formed aluminum corner brackets.
E. OPERATOR CONSTRUCTION: Electromechanical, modular type construction.

PART III - EXECUTION

3.1 EXAMINATION

SITE VERIFICATION OF CONDITIONS: Installer must verify that base conditions previously installed under other sections are acceptable for product installation according to manufacturer's instructions. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of work. Do not start work until all negative conditions are corrected in a manner acceptable to the installer and manufacturer.

3.2 INSTALLATION

A. GENERAL: Installer shall be factory trained, certified by AAADM, and experienced to perform work of this section. Install door units plumb, level and true to line, without warp or rack of frames or sash with manufacturer's prescribed tolerances. Shims to comply with Florida Building Code and resist rotation of frame. Provide support and anchor in place as indicated on approved NOA drawing.

B. DISSIMILAR MATERIALS: Comply with AAMA 101, Appendix Dissimilar Materials by separating aluminum materials and other corrodi ble surfaces from sources of corrosion or electrolytic action contact points.

C. WEATHER-TIGHT CONSTRUCTION: Install header and framing members in a bed of sealant or with joint filler or gaskets. Coordinate installation with wall flashings and other components of construction.

D. ELECTRICAL: General or electrical contractor to install all wiring to operator on a separate circuit breaker routed into header. General or electrical contractor also to install all necessary power and low voltage wiring for proper operation of associated security systems.

3.3 CLEANING, ADJUSTMENT AND PROTECTION

A. CLEANING: After installation, installer to take following steps:
   1. Remove temporary coverings and protection of adjacent work areas.
   2. Remove construction debris from construction site and legally dispose of debris.
   3. Repair or replace damaged installed products.
   4. Clean product surfaces and lubricate operating equipment for optimum condition and safety.

B. ADJUSTMENT: AAADM certified technician shall inspect and adjust installation to assure compliance with ANSI A156.10.

C. ADVISE CONTRACTOR: Of precautions required through the remainder of the construction period, to ensure that doors will be without damage or deterioration (other than normal weathering) at the time of acceptance.
END OF SECTION 08 42 29.23
SECTION 08 42 29.23
SLIDING AUTOMATIC ENTRANCES - INTERIOR

PART I – GENERAL

1.1 SUMMARY

A. WORK INCLUDED: Furnish complete automatic aluminum door system, as specified, that has been manufactured, fabricated and installed as per manufacturer's criteria without defects, damage or failure.

B. RELATED WORK:
   1. Concrete: Division 03, applicable sections.
   2. Masonry: Division 04, applicable sections.
   3. Openings: Division 08, applicable sections.
   4. Electrical: Division 26, applicable sections.

1.2 REFERENCES

A. AMERICAN ASSOCIATION OF AUTOMATIC DOOR MANUFACTURERS (AAADM).

B. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):
   2. ANSI A156.10: For Power Operated Pedestrian Doors; Sliding Doors section.
   3. ANSI A156.5: Standard for Auxiliary Locks and Associated Products

C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) B221: Aluminum-Alloy Extruded Bars, Rods, Shapes and Tubes.

D. BUILDING OFFICIALS AND CODE ADMINISTRATORS INTERNATIONAL (BOCA)

E. INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS / UNIFORM BUILDING CODE (ICBO/UBC)

F. INTERNATIONAL CODE COUNCIL / INTERNATIONAL BUILDING CODE (ICC/IBC)

G. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 101: Safety to Life from Fire in Buildings & Structures.


I. INTERTEK, WARNOCK HERSEY (ETL): Testing Laboratory and Certification Agency joined with ETL SEMKO

J. UNDERWRITERS LABORATORY, INC. (USA & CANADA) UL 325: Electrical Door, Drapery, Gate, Louver, and Window Operators and Systems.
1.3 SUBMITTALS

A. SHOP DRAWINGS & PRODUCT DATA: Submit drawings and product data showing layout, profiles, product components including anchorage, accessories, finish and glazing details (where required).

B. CLOSEOUT SUBMITTALS: Submit the following:
   2. AAADM inspection compliance form completed and signed by certified AAADM inspector prior to doors being placed in operation as proof of compliance with ANSI A156.10.

1.4 QUALITY ASSURANCE AND PERFORMANCE REQUIREMENTS

A. INSTALLERS QUALIFICATIONS: Installer shall be factory trained, certified by AAADM, and experienced to perform work of this section.

B. MANUFACTURER’S QUALIFICATIONS: Manufacturer to have minimum (5) five years successful experience in the fabrication of automatic doors of the type required for this project. Manufacturer capable of providing field service representation during installation, approving acceptable installer and approving application method.

C. CERTIFICATIONS: Automatic sliding door systems and options shall be factory certified to meet performance design criteria in accordance with the following standards:
   1. ANSI A156.10: For Power Operated Pedestrian Doors; Sliding Doors section.
   3. ETL Listed: Tested to UL 325 Standard
   4. BOCA: Means of Egress, Power Operated Doors
   5. ICBO/UBC: Egress Through Lobbies
   6. ICC/IBC: Egress Section

D. OPERATING RANGE: -30° F to 130° F (-34° C to 54° C)

E. OPENING FORCE REQUIREMENTS FOR EMERGENCY EGRESS:
   1. Slide-swing panels shall require no more than 50 lbf. (222 N) of force to swing open. Slide-swing panels shall be capable of swinging out 90° from any position of slide movement.
   2. Slide-swing panels and swing-out sidelites shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
   3. If power fails, slide panels can be manually slid open with no more than 15 lbf (222 N) of force.
   4. Units are ETL listed as an exit way and are compliant with NFPA 101.

F. CLOSING FORCE REQUIREMENTS: Maximum force required to prevent sliding panel from closing = 28 lbf. (124.5 N) Adjustable Reversing Circuit will reopen door unit if closing path is obstructed.

G. HEADER CAPACITY: Header shall be capable of supporting:
1. Bi-parting: Up to 250 lbs. (113.4 kg) per slide panel over spans up to 16′-0″ (4877mm) without intermediate supports.

1.5 WARRANTIES

A. MANUFACTURER'S WARRANTY: Units to be warranted against defect in material and workmanship for a period of five year from the Date of Substantial Completion. Manufacturer's warranty is in addition to, and not limited to, other rights owner may have under Contract Documents.

B. DISTRIBUTOR'S WARRANTY: Five year warranty: Labor/transportation charges for defective parts replacement.

1.6 PROJECT CONDITIONS

FIELD MEASUREMENTS: Verify actual dimensions/openings by field measurements before fabrication and record on shop drawings. Coordinate with fabrication and construction schedule to avoid construction delays.

1.7 DELIVERY, STORAGE AND HANDLING

A. ORDERING AND DELIVERY: Comply with factory's ordering instructions and lead time requirements. Delivery shall be in factory's original, unopened, undamaged containers with identification labels intact.

B. STORAGE AND PROTECTION: Provide protection from exposure to harmful weather conditions and vandalism.

PART II – PRODUCTS

2.1 MANUFACTURER

HORTON AUTOMATICS, a division of Overhead Door Corporation, shall manufacture automatic sliding door(s) of type(s) and size(s) specified on plans and door schedule.

2.2 EQUIPMENT

A. MANUFACTURED DOOR UNITS: Shall include operator, header with roller track, carrier assemblies, framing, sliding door panel(s), sidelite(s), activation, safety devices and accessories required for complete installation.

   1. Configuration: Bi-parting
   2. Mounting Type:
      a. Perimeter mounted within rough opening with sliding panel(s) sliding along sidelite.
      b. Surface mounted with sliding panel(s) sliding along wall eliminating need for sidelite.
   3. Door Type:
      a. Type 310: Slide-swing panel(s) 'SX' shall slide along interior side. Unit has Swing-out sidelite 'SO'.

B. OPERATOR: The Electric Operating Mechanism shall be Profiler® Series 2000 Linear Drive. The operator shall be mounted and concealed within the header.
1. Operation shall be accomplished through a 1/8 HP DC permanent magnet working with a threadless, induction hardened stainless steel 1/2" (13mm) diameter linear drive shaft. Maximum current draw shall not exceed 3.15 amps. A linear travel block describes a helical path along the rotating shaft utilizing six aircraft quality ball bearings acting as an integral clutch. Linear drive shaft shall be self lubricating by means of integral oiler located in the travel block.

2. Master Control shall be 16 bit microprocessor controller with dual on-board seven-segment alphanumeric diagnostic display and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed. The control shall have minimum of 28 programmable parameters including the following functions as required by ANSI A156.10:
   a. Adjustable opening and closing speeds.
   b. Adjustable back-check and latching.
   c. Adjustable braking.
   d. Adjustable hold-open time between 1 to 30 seconds.
   e. Adjustable Reversing Circuit will reopen door unit if closing path is obstructed.
   f. Separate day and night modes of operation with security over-ride.

3. Finger Safety: Strike rail of sliding panel will stop short of adjacent sidelite; resulting opening is net slide.

4. On/Off Switch shall be supplied. When switched OFF, unit reverts to free manual operation (likewise during electrical power failure).

C. SECURITY AND SAFETY POWER FAIL OPTIONS:
   1. Automatic lock: Automatically locks slide function of door when in closed position. Additional power supply for autolock not acceptable.
      a. Autolock Fail Secure: If power fails the lock engages.
      b. Autolock Fail Safe: If power fails the lock disengages.
   2. Monitored Power Fail Options (battery back-up):
      a. Software Selectable Power Fail Open: If power fails the door slides open.
      b. Software Selectable Power Fail Close: If power fails the door slides closed.

D. PROFILER® HEADER: Shall be slim 4" (102mm) deep by 6" (152mm) high aluminum construction with extruded z-profile reinforcement for dead load and lateral strength. Header shall have removable face plate for service and adjustment of operator and controls. Header mounts flush to 4” framing jambs.
   1. Type 410 units will require 6” x 6” header.
   2. SpaceSaver™ headers shall be combined depth of 8” (203mm) with removable face plate for each.

E. CARRIER ASSEMBLIES AND HEADER ROLLER TRACK: Carrier assemblies shall support door panels with minimum four rollers per panel. Rollers will be steel, high quality ball bearing wheels 1-1/4" (32 mm) diameter. Anti-Derailing shall be accomplished by means of a continuous aluminum extrusion full length of slide panel travel. Overhead header roller track shall be continuous aluminum, nylon covered, and replaceable.

F. SLIDING PANEL(S) AND SIDE LITE(S): Shall be aluminum, 1-3/4" (44 mm) deep with narrow stile rails. An intermediate, horizontal rail (muntin bar), 2 1/4" (57 mm) wide, shall be
furnished for safety and division of glass (optional on 010 units). Standard bottom rail shall be 4” (102mm) tall. Sliding panels shall have concealed bottom guides to stabilize slide travel.

1. Weather-stripping: Along perimeter of sliding panel(s) and swing-out sidelite(s). Weatherstripping material captured in extruded aluminum door panel. Surface applied self-adhesive weatherstripping not acceptable. Adjustable spring-loaded double astragal weather-stripping at lead edge, double mohair at interlock rails

2. Standard glazing prep to be for 1/4” (6 mm) glass.

3. Sliding Panel and Sidelite Options shall be:
   a. Medium stile construction: 3 3/4” (95mm) wide vertical rails with 6 1/2” (165mm) tall bottom rail. Note: Medium stile construction will reduce slide opening.
   b. Wide stile construction: 5” (127mm) wide vertical rails with 6 1/2” (165mm) tall bottom rail. Note: Wide stile construction will reduce slide opening.
   c. Surface applied push bar 1 1/2” (32mm) wide in lieu of standard muntin bar.
   d. Custom horizontal muntins from 1/2” (13mm) to 10” (254mm) wide.
   e. Custom bottom rails up to 10” (254mm) tall.
   f. Additional and/or extra wide sidelites of size and type indicated.
   g. Recessed sidelite and track and non-threshold application.
   h. Prep for glazing 5/16” (16mm) to 1” (25mm).

G. BREAKOUT PANELS: Slide-swing panels can swing out min.90° from any position of slide movement and require no more than 50 lbf. (222 N) of force applied at the lock stile to open. Slide-swing panels and swing-out sidelite(s) shall utilize spring loaded ball detent.
   1. Slide-swing panels and swing-out sidelite(s) shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
   2. Breakout mechanism shall provide support across full width of the door, in normal operating mode. In breakout mode, torsion assembly shall support weight of the door to minimize drop during emergency egress.
   3. Slide-swing panels shall include intermediate horizontal rail.
   4. Units with breakout feature are ETL listed as an exit away and are compliant with NFPA 101.

H. JAMBS FRAME: Shall be aluminum. Jamb dimensions to be:
   1. 1 3/4” (44mm) deep by 4” (102mm) wide for Types 010, 110, & 310. Optional jambs include:
      a. 1 3/4” (44mm) deep by 4 1/2” (114mm) wide.
      b. 1 3/4” (44mm) deep by 6” (152mm) wide. Maximum height: 8’-8”.
      c. 2” (51mm) deep by 6” (152mm) wide. Maximum height: 8’-8”.
      d. 4” (102mm) square. Maximum height: 8’-8”.
   2. 1 3/4” (44mm) deep by 6” (152mm) wide for Type 410.
   3. 1 3/4” (44mm) deep by 8” (152mm) wide for SpaceSaver™.
   4. Frame Option: Transom of size and type indicated, mounted on header

I. THRESHOLD: Shall be aluminum, 1/2” (25 mm) tall by 4” (102 mm) wide. Optional 7” (178 mm) wide.
J. HARDWARE: ANSI A156.5, Grade 1, 2-Point Locking provided and installed in strike rail shall include:
   1. Hookbolt Latch, 5/8” laminated stainless steel, latching into jamb or adjacent strike rail.
   2. 3/8” hex-bolt into breakout carrier frame.
   3. Keyed 1 5/32” (29 mm) Cylinder mounted on exterior side with 31/32” (25 mm) backset
   4. Thumbturn mounted on interior side.
   5. Hardware Options:
      a. 3-Point locking for biparting doors
      b. Flush Panic Exit Device recessed in 6 ½” muntin bar for door types 310.
      c. Surface mounted Panic Exit Device for door type 310.

2.3 RELATED EQUIPMENT

A. BASIC SENSOR SYSTEM: Shall be 24 VDC, class II circuit and shall be adjusted and installed in compliance with ANSI A156.10. System shall include the following:

B. ACTIVATION SENSORS: Microwave or active infrared sensor shall be header-mounted each side of door unit for detection of traffic from each direction.

C. THRESHOLD PRESENCE SENSORS:
   1. Header mounted sensors shall provide active infrared presence detection on each side of the door unit and shall remain active throughout the entire door opening and closing cycle.
   2. Hold-open beams: Two pulsed infrared photoelectric beams to be mounted in vertical rails of sidelite or in jambs. Sender/receiver arrangement parallels door opening.

2.4 RELATED WORK REQUIREMENTS

A. ELECTRICAL: 120 VAC, 50/60 cycle, single phase, dedicated 20 amp circuit per operator. Non-North American voltages can be 240 VAC 50/60 cycle (operator must have 240 volt power supply).

B. GLASS AND GLAZING: Glass stops, glazing vinyl and setting blocks for field glazing as per Safety Glazing standard ANSI Z97.1.2. Contractor to coordinate acquisition of glass in thickness and type in accordance with manufacturer's recommendations for prescribed design.

2.5 MATERIALS, FINISHES AND FABRICATION

A. EXTRUDED ALUMINUM: ASTM B221, 6063-T5 alloy and temper, anodized:
   1. Structural Header Sections: Minimum 3/16” (5 mm) thickness.
   2. Structural Frame Sections: Minimum 1/8” (3 mm) thickness.
   3. Structural Panel Sections: Commercial grade.

B. FINISHES (for all exposed aluminum surfaces): Shall be one of the following:
   1. 204-R1 Clear: Arch. Class 2 Clear Anodized Coating, AA-M12C22A31.
   2. 313-R1 Dark Bronze: Arch. Class 1 Anodized Coating, AA-M12C22A44.
   3. See door schedule for locations of finishes.
C. PANEL CONSTRUCTION:
   1. Corner block type with 3/16” steel backup plate construction, mechanically secured with minimum of four hardened steel screws. Sash consists of snap-in glass stops, snap-in glazing beads and vinyl gaskets.
   2. Slide-swing doors to be supplied with adjustable glass setting block to allow for adjusting of door to meet site conditions eliminating the need for additional shims.

D. FRAME CONSTRUCTION: Butt joints, mechanically secured with screws and formed alum. corner brackets.

E. OPERATOR CONSTRUCTION: Electromechanical, modular type construction.

PART III - EXECUTION

3.1 EXAMINATION

SITE VERIFICATION OF CONDITIONS: Installer must verify that base conditions are acceptable for product installation according to with manufacturer's instructions. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of work. Do not start work until all negative conditions are corrected.

3.2 INSTALLATION

A. GENERAL: Installer shall be factory trained, certified by AAADM, and experienced to perform work of this section. Install door units plumb, level and true to line, without warp or rack of frames or sash with manufacturer's prescribed tolerances. Provide support and anchor in place. Provide weather-tight construction.

B. ELECTRICAL: General or electrical contractor to install all wiring to operator on a separate circuit breaker routed into header. General or electrical contractor also to install all necessary power and low voltage wiring for proper operation of associated security systems.

3.3 CLEANING, ADJUSTMENT AND PROTECTION

A. CLEANING: After installation, installer will clean product surfaces and lubricate operating equipment for optimum condition and safety. Advise contractor of precautions required through the remainder of the construction period, to ensure that doors will be without damage or deterioration at the time of acceptance.

B. ADJUSTMENT: AAADM certified technician to inspect and adjust installation. Comply with ANSI A156.10.

END OF SECTION 08 42 29.23
SECTION 08 42 43
TRAUMA ENTRANCES

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. Manually operated Trauma Room entrances.
B. Related Section:
   1. Section 08 42 29.23 "Sliding Automatic Entrances" for entrances packaged with sliding automatic door operators and controls.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles and finishes for entrances.
B. Shop Drawings: For Trauma entrance, include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.
C. Samples for Initial Selection: For units with factory-applied color finishes.
D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For qualified Installer.
B. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.
B. Source Limitations: Obtain Trauma entrances from single source from single manufacturer.
C. Pre-installation Conference: Conduct conference at Project site.
1.6 PROJECT CONDITIONS
   A. Field Measurements: Verify actual dimensions of openings to receive
      Trauma entrances by field measurements before fabrication.

1.7 COORDINATION
   A. Coordinate sizes and locations of recesses in concrete floors for recessed
      sliding tracks. Concrete, reinforcement, and formwork requirements are
      specified elsewhere.
   B. Templates: Distribute for doors, frames, and other work specified to be
      factory prepared for installing Trauma entrances.

1.8 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer
      agrees to repair or replace components of Trauma entrances that fail in
      materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
         a. Structural failures including, but not limited to, excessive
            deflection.
         b. Faulty operation of hardware.
         c. Deterioration of metals, metal finishes, and other materials
            beyond normal use.
      2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Aluminum: Alloy and temper recommended by manufacturer for type of use
      and finish indicated.
   B. Sealants and Joint Fillers: As specified in Section 07 92 00 "Joint Sealants."
   C. Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, non-
      staining grout complying with ASTM C 1107; of consistency suitable for
      application.
   D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D
      1187.

2.2 PERFORMANCE REQUIREMENTS
   A. Opening-Force Requirement, Sliding: Not more than 5 lbf (22.2 N) to fully
      open door.
   B. Air Leakage: Entrance assemblies for assemblies for smoke control and
      pressurized rooms shall be listed and labeled for smoke and draft control by
      qualified testing agency acceptable to authorities having jurisdiction,
based on testing according to UL 1784 and having maximum air leakage according to NFPA 105 unless otherwise indicated.

2.3 MANUAL TRAUMA ROOM ENTRANCE ASSEMBLIES

A. General: Provide manufacturer's and factory-glazed entrances including door leaves, sidelites, framing, headers, carrier assemblies, roller tracks, and accessories required for a complete installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Besam Entrance Solutions; an ASSA ABLOY Group company.
      VersaMax™ Sliding Door Package equal to Model VMT3FBO-12 - VersaMax Telescopic OHC Single Slide unit.

B. Sliding Entrances:
   1. Configuration: Telescopic single slide three-panel door, SX-SX-SO.
   3. Floor Track Configuration: No track across sliding-door opening.
   4. Door Stile Design: Medium stile; 3-1/2-inch (90-mm) nominal width.
   5. Rail Design: 9-inch (229-mm) nominal height.
   6. Muntin Bars: On each panel.
   7. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets for glazing indicated, wet glazing not allowed.
   10. Finish: Finish framing, panels, and header with Class I, clear anodic finish.
   11. Clear Opening Width with panels slide to one side: 60 inches.

2.4 COMPONENTS

A. Framing and Transom Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.
   1. Nominal Size: 1-3/4 by 4-1/2 inches (45 by 115 mm).
   2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch (1.6-mm) wall thickness.

B. Stile and Rail Doors (Panels): Manufacturer's standard 1-3/4-inch- (45-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie rods that span full length of top and bottom rails.
   1. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets for glazing indicated.
   2. Muntin Bars: Horizontal tubular rail member for each panel; match stile design.

C. Sidelites: Manufacturer’s standard 1-3/4” deep sidelites with minimum 0.125-inch-(3.2mm) thick, extruded aluminum tubular stile and rail door.
   1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
2. Mutin Bars: Horizontal tubular rail member for each sidelite; match stile design.

D. Glazing: As specified in Section 08 80 00 "Glazing."

E. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick extruded aluminum, and extending full width of Trauma entrance units to conceal carrier assemblies and roller tracks. Provide hinged or removable access panels for service and adjustment. Secure panels to prevent unauthorized access.
   1. Capacity: Capable of supporting doors up to 100 lb (45 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.
   2. Provide sag rods for spans exceeding 14 feet (4.3 m).

F. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track or of ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly. Provide minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.

G. Concealed Bottom Rollers: Manufacturer's standard.

H. Brackets and Reinforcements: Manufacturer's standard, high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

I. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 HARDWARE

A. General: Provide units in sizes and types recommended by TRAUMA entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish unless otherwise indicated.

B. Pulls: Manufacturer's standard recessed units on both sides of each operable door and surface-mounted, D-shaped pull for each swing-out sidelite.


D. Smoke/Weather Seal Components: Manufactures standard replaceable smoke and draft control components as required to meet performance specifications.
   1. Compression Type: ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
   2. Sliding Type: AAMA 701, wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
   3. Sweeps: Manufacturer's standard, nylon brush sweep mounted to underside of door bottom.

2.6 FABRICATION

A. General: Factory fabricate Trauma entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
   1. Fabricate aluminum components before finishing.
   2. Weld in concealed locations to greatest extent possible to minimize
distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing, fabricated from stainless steel.
   a. Where fasteners are subject to loosening or turning out from structural movements or vibration, use self-locking devices.
   b. Reinforce members as required to receive fastener threads.

4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

B. Framing: Provide entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
   1. Fabricate tubular and channel frame assemblies with manufacturer’s standard welded or mechanical joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
   2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
   3. Form profiles that are straight and free of defects or deformations.
   4. Provide components with concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
   6. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.
   7. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

C. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA’s "Glazing Manual."

D. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.
   1. Provide sliding weather stripping, mortised into door, at perimeter of sliding doors and breakaway sidelites.

E. Electrical Grounding: Fabricate Trauma entrances to be internally grounded, complying with requirements of authorities having jurisdiction.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if...
they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES
A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of entrances.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.
B. Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
   1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
   2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
   3. Level recesses for recessed floor tracks using shrinkage-resistant grout.
C. Glazing: Install glazing as specified in Section 08 80 00 "Glazing."
D. Sealants: Comply with requirements in Section 07 92 00 "Joint Sealants" for installing sealants, fillers, and gaskets.
   1. Set framing members, floor tracks, and flashings in full sealant bed.
   2. Seal perimeter of framing members with sealant.
E. Grounding: Connect Trauma entrance, electrical grounding systems to building grounding system as specified in Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.3 ADJUSTING
A. Adjust operating hardware and moving parts for smooth and safe operation; lubricate as recommended by manufacturer.
B. Adjust force to open swing panels.
C. Test grounding system for compliance with requirements of authorities having jurisdiction.
3.4 CLEANING AND PROTECTION

A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

B. Comply with requirements in Section 08 80 00 "Glazing" for cleaning and protecting glass.

END OF SECTION 08 42 43
SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:
   a. Mechanical door hardware for the following:
   b. Swinging doors.
   c. Electrified door hardware.

B. Related Sections:
   a. Section 014500 "Windstorm Construction Requirements" for door hardware components that are installed in exterior doors and frames.
   b. Section 064100 "Plastic-Laminate-Faced Architectural Cabinets" for cabinet door hardware provided with cabinets.
   c. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
   d. Section 081416 "Flush Wood Doors" for astragals and integral intumescent seals provided as part of labeled fire-rated assemblies.
   e. Section 083113 "Access Doors and Frames" for access door hardware, except cylinders.
   f. Section 084113 "Aluminum-Framed Entrances and Storefronts" for installation of entrance door hardware, except cylinders.
   g. Section 084229.23 "Sliding Automatic Entrances" for entrance door hardware, except cylinders.
   h. Section 102600 "Wall and Door Protection" for plastic door protection units that match wall protection units.
   i. Section 281300 "Access Control" for access control devices installed at door openings and provided as part of a security system.
   j. Section 283100 "Fire Detection and Alarm" for connections to building fire-alarm system.

C. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.
1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Other Action Submittals:

a. Door Hardware Schedule: Prepared by or under the supervision of Door Hardware Supplier, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

   a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.

   b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

   c. Content: Include the following information:

      1) Identification number, location, hand, fire rating, size, and material of each door and frame.
      2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
      3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
      4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
      5) Fastenings and other pertinent information.
      6) Explanation of abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for door hardware.
      8) List of related door devices specified in other Sections for each door and frame.

b. Keying Schedule: Prepared by or under the supervision of Door Hardware Supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Door Hardware Supplier.

B. Product Certificates: For electrified door hardware, from the manufacturer.

a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

A. Door Hardware Supplier Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

   a. Warehousing Facilities: In Project's vicinity.
   b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
   c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.

   a. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

   a. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
G. Exterior Doors – Windstorm Construction: Hardware components shall form a complete system with door and frame installation that will meet requirements of Texas Department of Insurance – Windstorm Construction.

H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with Texas Architectural Barriers Act, Texas Government Code, Chapter 469.
   a. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
   b. Comply with the following maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
      b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   c. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
   d. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
   a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
   b. Preliminary key system schematic diagram.
   c. Requirements for key control system.
   d. Requirements for access control.
   e. Address for delivery of keys.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
1.8 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.9 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

   a. Failures include, but are not limited to, the following:

      a. Structural failures including excessive deflection, cracking, or breakage.
      b. Faulty operation of doors and door hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

   b. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

      a. Electromagnetic Locks: Five years from date of Substantial Completion.
      b. Exit Devices: Two years from date of Substantial Completion.
      c. Manual Closers: 10 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
a. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products and complying with BHMA designations referenced.
b. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

a. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hagar
   b. Ives
   c. McKinney

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

C. Lock Trim:

a. Description: As noted in schedule.
b. Levers: Cast.
c. Escutcheons: Cast.
d. Dummy Trim: Match lever lock trim and escutcheons.
e. Operating Device: Lever with escutcheons.

D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

a. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
b. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
c. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
d. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
E. Mortise Locks: BHMA A156.13; Grade 2; Series 1000.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. SARGENT – To tie into existing keying system

2.4 ELECTRIC STRIKES
A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. HES
      b. Von Duprin

2.5 ELECTROMAGNETIC LOCKS
A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and
armature plate attached to door; full-exterior or full-interior type, as required by application indicated.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Securitron
      b. Locknetics

2.6 MANUAL FLUSH BOLTS
A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Ives
      b. Hagar
      c. Rockwood Manufacturing Company

2.7 EXIT DEVICES AND AUXILIARY ITEMS
A. Exit Devices and Auxiliary Items: BHMA A156.3.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. SARGENT
      b. Von Duprin

FINISH HARDWARE
08 71 00- 7
2.8 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
   a. Manufacturer: Same manufacturer as for locking devices.

B. Standard Lock Cylinders: BHMA A156.5; Grade 2; face finished to match lockset.


2.9 KEYING

   a. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders to tie into existing keying system

B. Keys: Nickel silver.
   a. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
      a. Notation: "DO NOT DUPLICATE."
   b. Quantity: In addition to one extra key blank for each lock, provide the following:

2.10 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.
   Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ives
   b. Hagar
   c. Rockwood Manufacturing Company

2.11 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer’s written recommendations for size of door closers depending on size of door, exposure to weather, and
anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

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

   a. LCN
   b. Norton Door Controls
   c. SARGENT

2.12 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; Stainless steel base metal.

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

      a. Hager
      b. Ives
      c. Rockwood Manufacturing Company

2.13 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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

      a. National Guard
      b. Pemko

2.14 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

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

      a. National Guard
      b. Pemko

2.15 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch thick stainless steel with manufacturer's standard machine or self-tapping screw fasteners.

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

FINISH HARDWARE
08 71 00- 9
2.16 FABRICATION

A. Manufacturer’s Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
   a. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
   a. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
   b. Fire-Rated Applications:
      a. Wood or Machine Screws: For the following:
         1) Hinges mortised to doors or frames.
         2) Strike plates to frames.
         3) Closers to doors and frames.
      b. Steel Through Bolts: For the following unless door blocking is provided:
         1) Surface hinges to doors.
         2) Closers to doors and frames.
         3) Surface-mounted exit devices.
   c. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
   d. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
   e. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
2.17 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

   b. Custom Steel Doors and Frames: HMMA 831.
   c. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished
in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

a. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
b. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
a. General contractor to replace construction cores with permanent cores as.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

a. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
b. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.
C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

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<thead>
<tr>
<th>Hardware Set 1</th>
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<tbody>
<tr>
<td>Door #: 101A, 101B, 129A, &amp; 129B</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>2 EA Cylinder</td>
</tr>
<tr>
<td>6342 US32D SA</td>
</tr>
<tr>
<td>Balance by others</td>
</tr>
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</table>

<table>
<thead>
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<th>Hardware Set 1A</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>1 EA Cylinder</td>
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<tr>
<td>6342 US32D SA</td>
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<td>Balance by others</td>
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<table>
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</tr>
</thead>
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<tr>
<td>1 EA Exit Lock</td>
</tr>
<tr>
<td>60 63 8225 LE1L US26D SA</td>
</tr>
<tr>
<td>1 EA Electric Strike</td>
</tr>
<tr>
<td>1006CDB 630 HS</td>
</tr>
<tr>
<td>1 EA Surface Closer</td>
</tr>
<tr>
<td>TB 351 CPS EN</td>
</tr>
<tr>
<td>1 EA Kick Plate</td>
</tr>
<tr>
<td>K1050 12&quot; x 2&quot; Idw US32D RO</td>
</tr>
<tr>
<td>1 EA Threshold</td>
</tr>
<tr>
<td>2005AV 48&quot; PE</td>
</tr>
<tr>
<td>1 EA Gasketing</td>
</tr>
<tr>
<td>303AV 48&quot; 84&quot; PE</td>
</tr>
<tr>
<td>1 EA Rain Guard</td>
</tr>
<tr>
<td>346C 52&quot; PE</td>
</tr>
<tr>
<td>Card Reader by others</td>
</tr>
<tr>
<td>Power Supply by others</td>
</tr>
</tbody>
</table>

Sequence of operation:
1. Entry from secure side – By valid credential in card reader allows electric strike to release latch on lockset or key in cylinder allows entry into area.
   Electric strike is Fail Secure and with loss of power door is secure.
2. Exit from room requires no special knowledge.
Hardware Set 3

Door #: 188A
Each to receive:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Description</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Hinge</td>
<td>T4A3386xNRP 4-1/2&quot; x 4-1/2&quot; US32D</td>
<td>MK</td>
</tr>
<tr>
<td>2</td>
<td>Electric Hinge</td>
<td>T4A3386-QC12 4-1/2&quot; x 4-1/2&quot; US32D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>Mullion</td>
<td>HC980 PC</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Rim Exit Device</td>
<td>HC 55 56 8813 ETL US32D</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Surface Closer</td>
<td>TB 351 CPS EN</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Kick Plate</td>
<td>K1050 12&quot; x 1&quot; ldw US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>Mullion</td>
<td>HC980 PC</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Rim Exit Device</td>
<td>HC 55 56 8813 ETL US32D</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Surface Closer</td>
<td>TB 351 CPS EN</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>Kick Plate</td>
<td>K1050 12&quot; x 1&quot; ldw US32D</td>
<td>RO</td>
</tr>
</tbody>
</table>

Sequence of operation:
1. Entry from secure side – By valid credential in card reader allows latch to be retracted on exit device or key in cylinder allows entry into area. Exit device is Fail Secure and with loss of power door is secure.
2. Exit from room requires no special knowledge.

Hardware Set 4

Each to receive:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Description</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>Storeroom Lock</td>
<td>60 63 8204 LE1L US26D</td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>Electric Strike</td>
<td>8500 630</td>
<td>HS</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
<td>1431 UO EN</td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>Kick Plate</td>
<td>K1050 12&quot; x 2&quot; ldw US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>441 US26D</td>
<td>RO</td>
</tr>
<tr>
<td>3</td>
<td>Silencer</td>
<td>608</td>
<td>RO</td>
</tr>
</tbody>
</table>

Sequence of operation:
1. Entry from secure side – By valid credential in card reader allows electric strike to release latch on lockset or key in cylinder allows entry into area. Electric strike is Fail Secure and with loss of power door is secure.
2. Exit from room requires no special knowledge.

Hardware Set 4A

Door #: 169C
Each to receive:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Description</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>Storeroom Lock</td>
<td>60 63 8204 LE1L US26D</td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>Electric Strike</td>
<td>8500 630</td>
<td>HS</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
<td>1431 UO EN</td>
<td>SA</td>
</tr>
</tbody>
</table>

Finish Hardware
08 71 00-14
Sequence of operation:
1. Entry from secure side – By valid credential in card reader allows electric strike to release latch on lockset or key in cylinder allows entry into area. Electric strike is Fail Secure and with loss of power door is secure.
2. Exit from room requires no special knowledge.

**Hardware Set 5**

Door #: 179A & 188C

Each to receive:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Description</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>EA Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>EA Magnetic Lock</td>
<td>M62</td>
<td>SU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounts on door leaf that swings into ED.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Magnet lies into fire alarm</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EA Surface Vert Rod Exit</td>
<td>12 NB8710 EO US32D</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>EA Surface Closer</td>
<td>1431 UO EN</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>EA Kick Plate</td>
<td>K1050 36&quot; x 1&quot; ldw US32D</td>
<td>RO</td>
</tr>
<tr>
<td>2</td>
<td>EA Door Stop</td>
<td>441 US26D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>EA Gasketing</td>
<td>S88BL x door perimeter</td>
<td>PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Card Reader by others</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power Supply by others</td>
<td></td>
</tr>
</tbody>
</table>

Sequence of operation:
Note this opening is double egress, one door swings into the area and other door swings out of the area.
1. Entry from secure side – By valid credential in card reader allows magnetic lock on door swinging into secured area to release & allows entry into area.
2. In case of fire magnet is tied into fire alarm and power is cut allowing this side of opening to allow egress.
3. Exit from room on other side of opening requires no special knowledge.

**Hardware Set 5A**

Door #: 102B

Each to receive:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Description</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>EA Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>EA Magnetic Lock</td>
<td>M62</td>
<td>SU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounts on door leaf that swings into ED.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Magnet lies into fire alarm</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EA Surface Vert Rod Exit</td>
<td>LD NB8713 ETL US32D</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>EA Surface Closer</td>
<td>1431 UO EN</td>
<td>SA</td>
</tr>
<tr>
<td>2</td>
<td>EA Kick Plate</td>
<td>K1050 12&quot; x 1&quot; ldw US32D</td>
<td>RO</td>
</tr>
<tr>
<td>2</td>
<td>EA Door Stop</td>
<td>441 US26D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>EA Gasketing</td>
<td>S88BL x door perimeter</td>
<td>PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Card Reader by others</td>
<td></td>
</tr>
</tbody>
</table>

Card Reader by others

Power Supply by others

**FINISH HARDWARE**

08 71 00- 15
Power Supply by others

Sequence of operation:

Note this opening is double egress, one door swings into the area and other door swings out of the area.

1. Entry from secure side – By valid credential in card reader allows magnetic lock on door swinging into secured area to release & allows entry into area.
2. In case of fire magnet is tied into fire alarm and power is cut allowing this side of opening to allow egress.
3. Exit from room on other side of opening requires no special knowledge.

Hardware Set 6
Door #: 157A & 158A
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Model/Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>6</td>
<td>T4A3786</td>
<td>4-1/2&quot; x 4-1/2&quot; US26D MK</td>
</tr>
<tr>
<td>Surface Vert Rod Exit</td>
<td>2</td>
<td>12 NB8710 EO US32D SA</td>
<td></td>
</tr>
<tr>
<td>Surface Closer</td>
<td>2</td>
<td>1431 UO EN SA</td>
<td></td>
</tr>
<tr>
<td>Kick Plate</td>
<td>2</td>
<td>K1050 36&quot; x 1&quot; ldw US32D RO</td>
<td></td>
</tr>
<tr>
<td>Door Stop</td>
<td>2</td>
<td>441 US26D RO</td>
<td></td>
</tr>
<tr>
<td>Gasketing</td>
<td>1</td>
<td>S88BL x door perimeter PE</td>
<td></td>
</tr>
</tbody>
</table>

Hardware Set 7
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Model/Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>3</td>
<td>TA2714</td>
<td>4-1/2&quot; x 4-1/2&quot; US26D MK</td>
</tr>
<tr>
<td>Privacy Lock</td>
<td>1</td>
<td>VNA 8265 LE1L US26D SA</td>
<td></td>
</tr>
<tr>
<td>Surface Closer</td>
<td>1</td>
<td>1431 UO EN SA</td>
<td></td>
</tr>
<tr>
<td>Door Stop</td>
<td>1</td>
<td>441 US26D RO</td>
<td></td>
</tr>
<tr>
<td>Gasketing</td>
<td>1</td>
<td>S88BL x door perimeter PE</td>
<td></td>
</tr>
</tbody>
</table>

Hardware Set 8
Door #: 109B, 110B, 114.2A, & 119A
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Model/Code</th>
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<tr>
<td>Hinge</td>
<td>3</td>
<td>T2714</td>
<td>4-1/2&quot; x 4-1/2&quot; US26D MK</td>
</tr>
<tr>
<td>Passage Latch</td>
<td>1</td>
<td>8215 LE1L US26D SA</td>
<td></td>
</tr>
<tr>
<td>Door Stop</td>
<td>1</td>
<td>441 US26D RO</td>
<td></td>
</tr>
<tr>
<td>Gasketing</td>
<td>1</td>
<td>S88BL x door perimeter PE</td>
<td></td>
</tr>
</tbody>
</table>

Hardware Set 8A
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Model/Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>3</td>
<td>T2714</td>
<td>4-1/2&quot; x 4-1/2&quot; US26D MK</td>
</tr>
</tbody>
</table>

FINISH HARDWARE
08 71 00- 16
<table>
<thead>
<tr>
<th>Hardware Set 8B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #: 123A, 124A, 125A, 126A, 131A, 149A, &amp; 150A</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>3 EA Hinge</td>
</tr>
<tr>
<td>1 EA Hospital Latch</td>
</tr>
<tr>
<td>1 EA Door Stop</td>
</tr>
<tr>
<td>1 EA Gasketing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware Set 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #: 136A, 144A, 144B, 146A, 152A, &amp; 165A</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>3 EA Hinge</td>
</tr>
<tr>
<td>1 EA Storeroom Lock</td>
</tr>
<tr>
<td>1 EA Surface Closer</td>
</tr>
<tr>
<td>1 EA Kick Plate</td>
</tr>
<tr>
<td>1 EA Door Stop</td>
</tr>
<tr>
<td>1 EA Gasketing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware Set 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #: 171A, 172A, 173A, 182A, &amp; 183A</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>3 EA Hinge</td>
</tr>
<tr>
<td>1 EA Office Lock</td>
</tr>
<tr>
<td>1 EA Door Stop</td>
</tr>
<tr>
<td>1 EA Gasketing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware Set 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #: 137A, 141A, 160A, 161A, 166A, &amp; 167A</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
<tr>
<td>3 EA Hinge</td>
</tr>
<tr>
<td>1 EA Storeroom Lock</td>
</tr>
<tr>
<td>1 EA Kick Plate</td>
</tr>
<tr>
<td>1 EA Door Stop</td>
</tr>
<tr>
<td>1 EA Gasketing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware Set 11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #: 135A, &amp; 178A</td>
</tr>
<tr>
<td>Each to receive:</td>
</tr>
</tbody>
</table>

FINISH HARDWARE
08 71 00- 17
3 EA Hinge T2714 4-1/2" x 4-1/2" US26D MK
1 EA Storeroom Lock 60 63 8204 LE1L US26D SA
1 EA Surface Closer 1431 UO EN SA
1 EA Kick Plate K1050 12" x 2" ldw US32D RO
1 EA Door Stop 441 US26D RO
1 EA Gasketing S88BL x door perimeter PE

**Hardware Set 12**

Door #: 180A

Each to receive:

<table>
<thead>
<tr>
<th>EA</th>
<th>Hardware</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
</tr>
<tr>
<td>1</td>
<td>Classroom Lock</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
</tr>
<tr>
<td>1</td>
<td>Kick Plate</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
</tr>
<tr>
<td>3</td>
<td>Silencer</td>
</tr>
</tbody>
</table>

Door #: 159A

Each to receive:

<table>
<thead>
<tr>
<th>EA</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous Hinge</td>
</tr>
<tr>
<td>1</td>
<td>Privacy Lock</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
</tr>
<tr>
<td>3</td>
<td>Silencer</td>
</tr>
</tbody>
</table>

Door #: 162A & 163A

Each to receive:

<table>
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<tr>
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<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous Hinge</td>
</tr>
<tr>
<td>1</td>
<td>Passage Latch</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
</tr>
<tr>
<td>1</td>
<td>Gasketing</td>
</tr>
</tbody>
</table>

Door #: 201A, 202C

Each to receive:

<table>
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<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
</tr>
<tr>
<td>1</td>
<td>Exit Lock</td>
</tr>
<tr>
<td>1</td>
<td>Overhead Stop</td>
</tr>
<tr>
<td>1</td>
<td>Gasketing</td>
</tr>
<tr>
<td>1</td>
<td>Rain Guard</td>
</tr>
</tbody>
</table>

**FINISH HARDWARE**

08 71 00- 18
# Hardware Set 16

Door mark: 111B  
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>Classroom Lock</td>
<td>60 63 8237 LE1L US26D</td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>441 US26D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>Gasketing</td>
<td>S88BL x door perimeter</td>
<td>PE</td>
</tr>
</tbody>
</table>

# Hardware Set 16A

Door mark: 169B  
Each to receive:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot; US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1</td>
<td>Classroom Lock</td>
<td>60 63 8237 LE1L US26D</td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>441 US26D</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>Threshold</td>
<td>171A X d.w.</td>
<td>PE</td>
</tr>
<tr>
<td>1</td>
<td>Gasketing</td>
<td>S88BL x door perimeter</td>
<td>PE</td>
</tr>
</tbody>
</table>

END OF SECTION 08 71 00
SECTION 08 71 13

AUTOMATIC DOOR
OPERATORS

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. High energy power door operators for swinging doors.
   2. Low-energy door operators for swinging doors.

B. Related Requirements:
   1. Section 08 42 29 "Sliding Automatic Entrances" for sliding doors and frames packaged with automatic door operators.
   2. Division 26 Sections for electrical connections including conduit and wiring for automatic entrance operators.
   3. Division 28 Sections for connections including conduit and wiring for automatic entrance access-control devices.

1.3 DEFINITIONS
A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

C. Double-Egress (Doors): A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.

D. Double-Swing (Doors): A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.

E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.

F. For automatic door terminology, see BHMA A156.10 and BHMA A15 6.19 for definitions of terms.

1.4 COORDINATION
A. Coordinate sizes and locations of recesses in concrete floors for recessed control mats that control automatic door operators. Concrete, reinforcement, and formwork requirements are specified elsewhere.
B. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing automatic door operators.

C. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.

D. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and access-control system.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For automatic door operators.
   1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
   2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Indicate locations of activation and safety devices.
   4. Include diagrams for power, signal, and control wiring.
   5. Include plans, elevations, sections, and attachment details for guide rails, if required.

C. Samples: For each exposed product and for each color and texture specified, manufacturer's standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of automatic door operator.

C. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain automatic door operators, including activation and safety devices, from single source from single manufacturer.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project.
   1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
1.9 WARRANTY
A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Faulty or sporadic operation of automatic door operator, including controls.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 AUTOMATIC DOOR OPERATORS, GENERAL
A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
   1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet de motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.

C. Hinges: Reference Section 08 71 00 "Door Hardware" for hinge type for each door that door operator shall accommodate.

D. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- (3.2-mm-) thick, extruded or formed aluminum; continuous over full width of operator- controlled door opening; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

E. Brackets and Reinforcements: Fabricated from aluminum with non-staining, nonferrous shims for aligning system components.

F. Fire-Door Package (if required): Consisting of UL-listed latch mechanism, power- reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2.2 HIGH ENERGY POWER DOOR OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Besam Entrance Solutions; Swingmaster 900.
   2. DORMA Automatics; ED4 00-SA.
   3. Horton Automatics; PowerSwing Series 4700.
   4. Record-USA; 8000 Series.
   5. Stanley Access Technologies, LLC; Magic-Swing.

B. Standard: BHMA A156.10.

C. Performance Requirements:
   1. Opening Force:
      a. Power-Operated Swinging Doors: Not more than 30 lbf (133 N) required to manually open door if power fails and not more than 15 lbf (67 N) required to open door to minimum required width.

D. Configuration: As scheduled at end of Section.
   1. Operator to control single swinging door or pair of swinging doors.
   2. Traffic Pattern: Two way or double egress.

E. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.10.

F. Operating System: Electromechanical.

G. Microprocessor Control Unit: Solid-state controller.

H. Features:
   1. Adjustable opening and closing speed.
   2. Adjustable opening and closing force.
   3. Adjustable back-check.
   4. Adjustable hold-open time from zero to 30 seconds.
   5. Adjustable time delay.
   6. Adjustable acceleration.
   7. Adjustable limit switch.
   8. Obstruction recycle.
   9. Automatic door re-open if stopped while closing.
   10. On-off/hold-open switch to control electric power to operator; key operated.

I. Controls: Activation and safety devices according to BHMA standards.
   1. Activation Devices: Activate doors by the following equipment. Refer to the Door Schedule for locations.
      a. Card scanners (by others) on each side of door to activate door operator.
      b. Motion sensor mounted on ingress side of door header to detect pedestrians in activating zone and to open door.
      c. Push-plate switch Push-button switch on each side of door to activate door operator.
      d. Access by remote switch at Nurse's Station.
   2. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.

J. Exposed Finish: Finish matching door hardware.
2.3 LOW-ENERGY DOOR OPERATORS

A. Standard Duty:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Besam Entrance Solutions; SW100.
      b. DORMA Automatics; ED700.
      c. Horton Automatics; EasyAccess Series 7100.
      d. LCN Closers; 4600 Series.
      e. Record-USA; 6100 Series.

B. Standard: BHMA A156.19.

C. Performance Requirements:
   1. Opening Force if Power Fails: Not more than 15 lbf (67 N) required to release latch if provided, not more than 30 lbf (133 N) required to manually set door in motion, and not more than 15 lbf (67 N) required to fully open door.

D. Configuration: As scheduled at end of Section.
   1. Operator to control single swinging door or pair of swinging doors.
   2. Traffic Pattern: Two way or double egress.

E. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

F. Operating System: Electromechanical.

G. Microprocessor Control Unit: Solid-state controller.

H. Features:
   1. Adjustable opening and closing speed.
   2. Adjustable opening and closing force.
   3. Adjustable back-check.
   4. Adjustable hold-open time from zero to 30 seconds.
   5. Adjustable time delay.
   6. Adjustable acceleration.
   7. Obstruction recycle.
   8. On-off/hold-open switch to control electric power to operator; key operated.

I. Controls: Activation and safety devices according to BHMA standards.
   1. Activation Devices: Activate doors by the following equipment. Refer to the Door Schedule for locations.
      a. Card scanners (by others) on each side of door to activate door operator.
      b. Motion sensor mounted on ingress side of door header to detect pedestrians in activating zone and to open door.
      c. Push-plate switch on each side of door to activate door operator.
      d. Access by remote switch at Nurse's Station.
   2. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.
J. Exposed Finish: Finish matching door hardware.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

B. Expanded Aluminum Mesh: Expanded and flattened aluminum sheet according to the geometry of ASTM F 1267.

C. Fasteners and Accessories: Corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

A. General: Provide controls, including activation and safety devices, according to BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

B. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed in plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
   1. Provide capability for switching between bidirectional and unidirectional detection.
   2. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.

C. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

D. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
   1. Configuration: Rectangular push plate with 2-by-4-inch (50-by-100-mm) junction box.
      a. Mounting: Recess mounted, semi-flush in wall.
   3. Message: "Push to Open."

E. Key Switch: Recess-mounted, door control switch with key-controlled actuator; enclosed in 2-by-4-inch (50-by-100-mm) junction box. Provide faceplate engraved with text indicating switch functions.
   1. Faceplate Material: Stainless steel.
   2. Functions: Two-way automatic, hold open, one-way exit, and off.

F. Wireless or Remote Radio-Control Switch: Radio-control system consisting of header-mounted receiver and wall-mounted transmitter switch.
   1. Wall-Mounted Transmitter Switch: One red-button, momentary-contact actuator enclosed in 4-by-4-inch (100-by-100-mm) junction box. Provide blue plastic cover engraved with "Press Button to Open" in white text and with international symbol of accessibility.
G. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.6 FABRICATION
A. Factory fabricate automatic door operators to comply with indicated standards.
B. Form aluminum shapes before finishing.
C. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.
D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

2.7 ACCESSORIES

2.8 GENERAL FINISH REQUIREMENTS
A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining
D. Components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.
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. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
   1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
   2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.

B. Controls: Install activation and safety devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

C. Access-Control System: Connect operators to access-control system as specified in Section 28 13 00 "Access Control."

D. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

E. Guide Rails (if required): Install according to BHMA A156.10, including Appendix A and manufacturer's written instructions unless otherwise indicated.

3.3 ADJUSTING

A. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

B. After completing installation of automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

C. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
3.4 MAINTENANCE SERVICE
   A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of automatic door operator Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
      1. Engage a Certified Inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
      2. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

3.5 DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

3.6 SCHEDULE
   A. Single Swing Doors: Standard duty, low-energy type.
   B. Double Egress Cross Corridor Doors: Operator on each door, high-energy type.
   C. Procedure Room Door: Standard duty, low-energy type.

END OF SECTION 08 71 13
SECTION 08 80 00
GLAZING

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. Glass for windows, doors, interior borrowed lites, storefront framing glazed curtain walls.
   2. Specialty Glass

B. Related Requirements:
   1. Section 014500 "Windstorm Construction Requirements."
   2. Section 084113 "Aluminum Framed Entrances and Storefronts" - Interior.
   4. Section 084243 "Trauma Entrances."
   5. Section 088300 "Mirrors."
   6. Section 089110 "Glazed Aluminum Curtain Wall."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.


D. Interspace: Space between lites of an insulating-glass unit.
1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the following products; 12 inches square.

2. Coated glass.
3. Laminated glass.
4. Insulating-Laminated glass.

C. Glazing Accessory Samples: For sealants and colored spacers in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer, manufacturers of insulating-glass units with sputter-coated, low-E coatings, glass testing agency, and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For tinted glass, coated glass, insulating glass and glazing sealants, for tests performed by a qualified testing agency.
1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Solar-Control Reflective and/or Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by Guardian Industries Corp.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" and Section 089110 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data is submitted based on previous testing of current sealant products and glazing materials matching those submitted.

2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.

4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.11 FIELD 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 glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.12 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass that deteriorates within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to 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.

1. Warranty Period: Ten years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Industries Corp.; SunGuard Advanced Architectural Glass provided by the following:

1. Bendheim Art Glass
2. Garibaldi Glass Industries, Inc.
3. Glasswerks LA, Inc.
5. Insulated Glass of America, Inc.
6. JE Berkowitz, LP
7. Manko Window Systems, Inc.
8. Multiver Ltd.
10. Oldcastle BuildingEnvelope
11. PRL Glass Systems, Inc.
12. Red Bud Glass, Inc.
13. SAAND, Inc.
14. SIGCO, Inc.
15. Solar Seal Company
16. Thompson IG, LLC
17. Tristar Glass, Inc.
18. Trulite Aluminum & Glass Solutions, LLC
19. United Plate Glass Company
20. Vitrum Industries Ltd.
21. W.A. Wilson Glass

B. Source Limitations for Glass: Obtain ultraclear float glass, tinted float glass, coated float glass, laminated glass and insulating glass from single source from single manufacturer for each glass type.

C. Source Limitations for Solar-Control Reflective and Low-E Coated Glass: where solar-control reflective glass or low-E coated glass of a primary glass manufacturer that has established a certified fabricator program is specified, obtain glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings and specified in Section 014500 of specifications.
2. Openings shall meet the requirements of the Large Missile Test of ASTM E1996.
3. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE 7, based on heights above grade indicated on Drawings.
   a. Wind Design Data: As indicated on Structural Drawings S001.
   b. Basic Wind Speed: 128 MPH – 3 second gust
   c. Risk Category: I= 1.15.
   d. Exposure Category: C.
   e. Impact resistance for windborne debris shall be as determined by the Texas Windstorm Requirements per the Texas Department of Insurance Windstorm Inspection Program Revisions.
4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with protection testing requirements in ASTM E 1996 for zone as identified by Texas Department of Insurance Windstorm Program when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

1. Large-Missile Test: For glazing located within 30 feet of grade.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
2. U-Factors: Center-of-glazing values, according to NFRC 100-2010 and based on LBNL's WINDOW 6.3 program, expressed as Btu/sq. ft. x h x deg F.
3. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200-2010 and based on LBNL's WINDOW 6.3 program.
4. Visible Reflectance: Center-of-glazing values, according to NFRC 300-2010.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
   1. Minimum Glass Thickness for Exterior Lites: As required to meet Windstorm Construction requirements as indicated in approved assembly test reports.
   2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality –Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthen), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (Clear) or Class 2 (tinted) as indicated, Quality –Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Low-E Coated Vision Glass: ASTM C 1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.
   Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Industries Corp.; SunGuard SNX 51/23; Clear – Clear, providing an appearance of Light Blue.

E. Specialty Art Glass: Colored Specialty Art Glass, processed and complying with the following requirements specified.
   Basis-of-Design Product: Subject to compliance with requirements, provide Bendheim Art Glass, solid pattern, “Mature Grape” in color.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
   1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer’s written instructions.
   2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
   3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminated glass with one of the following to comply with interlayer manufacturer’s written instructions:
   1. Polyvinyl butyral interlayer.
   2. Polyvinyl butyral interlayers reinforced with polyethylene-terephthalate film.
   3. Ionomeric polymer interlayer.
2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they 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.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   d. Pecora Corporation.
   e. Sika Corporation.
   f. Tremco Incorporated.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; 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; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with 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, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of 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.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces temperature change.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, 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 systems.
   3. Minimum required face and 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.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

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. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. 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.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
F. Provide spacers for glass lites where length plus width is larger than 50 inches.

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 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.

G. 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.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

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. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, 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 right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant where required.
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.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch 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. Installation with Drive-in Wedge Gaskets: 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. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. 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 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.
B. Protect glass from contact with contaminating substances resulting from construction operations. 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 buildup of dirt, scum, alkaline deposits, or stains.

   1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type GL-1: Interior, Clear fully tempered float glass.
   1. Safety glazing required.

B. Glass Type GL-4: Interior, Clear fully tempered float glass.
   1. Safety glazing required.
   2. 3M One Way Mirror film.

3.9 LAMINATED GLASS SCHEDULE

   2. Interlayer Thickness: As required to meet Windstorm Construction requirements.
   3. Safety glazing required.

3.10 INSULATING-LAMINATED GLASS SCHEDULE

A. Glass Type GL-3: Exterior - Low-E-coated, clear insulating laminated glass.
   2. Overall Unit Thickness: 1 inch.
   3. Outdoor Lite: Clear heat-strengthened float glass.
   4. Interspace Content: Air.
   5. Indoor Lite: Laminated glass with two plies of Clear heat-strengthened float glass.
   7. Safety glazing required.
   8. Meet Windstorm Construction Requirements per Section 014500.
3.11 SPECIALTY ART GLASS SCHEDULE

A. Glass Type **GW-1**: Interior Accent Glazing.

1. Basis-of-Design Product: Bendheim Corporate
2. Mfr. No: TX-136932
3. Color: Mature Grape
4. Pattern: Solid
5. Provide CHRISTUS Health Logo in white applied to glass.
6. Hardware: Mockett MPB10 stainless steel stand-off – 1-1/4 inch diameter with 1/2 inch barrel height. (Spacer same diameter as cap) and screw length of 2-1/4 inch. Total of 12 required.

**END OF SECTION 08 80 00**
SECTION 08 83 00
MIRRORS

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 the following types of silvered flat glass mirrors:
   1. Tempered glass mirrors qualifying as safety glazing.
B. Related Requirements:
   1. Section 088000 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
   2. Section 102800 "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
C. Samples: For each type of the following:
   1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.

1.4 INFORMATIONAL SUBMITTALS
A. Sample Warranty: For special warranty.
1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For mirrors to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
   B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.7 FIELD CONDITIONS
   A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY
   A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
   B. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

2.2 SILVERED FLAT GLASS MIRRORS
   A. Mirrors, General: ASTM C 1503.
   B. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied; clear.

   1. Nominal Thickness: 3.0 mm.
   C. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.
2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.4 MIRROR HARDWARE

A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.

2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.


B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Fabricate mirrors in the shop to greatest extent possible.

B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

1. GANA Publications: "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.

3.3 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 83 00

MIRRORS

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SECTION 08 840 0

PLASTIC GLAZING

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. Monolithic acrylic glazing.
   2. Monolithic polycarbonate glazing.
   3. Multiwalled structured polycarbonate glazing.

B. Related Requirements:
   1. Section 088000 "Glazing".
   2. Section 088816 “Vision Control Glass – Integral Blinds” for glazing units with acrylic and polycarbonate glazing.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Plastic Glazing Samples: For each color and finish of plastic glazing indicated, 12 inches square and of same thickness indicated for final Work.

C. Glazing Accessory Samples: For gaskets and sealants, in 12-inch lengths

D. Plastic Glazing Schedule: List plastic glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of plastic glazing and construction that receives plastic glazing, including clearances and glazing channel dimensions.

PLASTIC GLAZING
08 84 00- 1
1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For testing agency.
B. Product Certificates: For plastic glazing and glazing products.
C. Product Test Reports: For plastic glazing, for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
D. Preconstruction adhesion and compatibility test report.
E. Research/Evaluation Reports: For plastic glazing.
F. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS
A. Maintenance Data: For plastic glazing to include in maintenance manuals.

1.7 QUALITY ASSURANCE
A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.8 PRECONSTRUCTION TESTING
A. Preconstruction Adhesion and Compatibility Testing: Test each plastic glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data are submitted based on previous testing of current sealant products and plastic glazing matching those submitted.

1.9 DELIVERY, STORAGE, AND HANDLING
A. Protect plastic glazing materials according to manufacturer’s written instructions. Prevent damage to plastic glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
B. Maintain protective coverings on plastic glazing to avoid exposures to abrasive substances, excessive heat, and other sources of possible deterioration.
1.10 FIELD 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 glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Abrasion- and UV-Resistant, Monolithic or Multiwalled Structured Polycarbonate: Manufacturer agrees to replace polycarbonate products that break or develop defects from normal use that are attributable to manufacturing process and not to practices for maintaining and cleaning plastic glazing contrary to manufacturer's written instructions. Defects include coating delamination, haze, excessive yellowing, and loss of light transmission beyond the limits stated in plastic glazing manufacturer's standard form.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain plastic glazing from single source from single manufacturer. Obtain sealants and gaskets from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. Plastic glazing sheets and glazing materials shall withstand normal temperature changes, wind, and impact loads without failure, including loss or breakage of plastic sheets attributable to the following: failure of sealants or gaskets to remain watertight and airtight, deterioration of plastic sheet and glazing materials, or other defects in materials and installation.

B. Safety Glazing: Plastic glazing shall comply with 16 CFR 1201, Category II.

1. Labeling: Permanently mark plastic glazing with certification label of an agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of plastic, thickness, and safety glazing standard with which plastic glazing complies.
C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on plastic glazing and glazing framing members.

1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

D. Fire-Test-Response Characteristics of Plastic Glazing: As determined by testing plastic glazing by a qualified testing agency acceptable to authorities having jurisdiction.

1. Self-ignition temperature of 650 deg F or higher when tested according to ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
2. Smoke density of 75 or less when tested according to ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
3. Burning extent of 1 inch or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.
4. Burning rate of 2.5 in./min. or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.
5. Flame-spread index of not less than that indicated when tested according to ASTM E 84.

2.3 PLASTIC GLAZING, GENERAL

A. Glazing Publication: Comply with published instructions of plastic glazing manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated. See this publication for definitions of glazing terms not otherwise defined in this Section or in other referenced standards.

B. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.

2.4 MONOLITHIC ACRYLIC GLAZING

A. Plastic Glazing Type PG-1: Transparent acrylic sheet; ASTM D 4802, Category A-2 (continuously cast), Finish 1 (smooth or polished), Type UVF (UV filtering).

1. Nominal Thickness: 0.177 inch.
2. Color: Colorless.

2.5 MONOLITHIC POLYCARBONATE GLAZING

A. Plastic Glazing Type PG-2: Polycarbonate sheet; ASTM C 1349, Appendix X1, Type I (standard, UV stabilized), with a polished finish.

1. Nominal Thickness: 0.500 inch.
2. Color: Transparent colorless.
4. Flame-Spread Index: 25 or less.
2.6 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets, EPDM, ASTM C 864 or silicone, ASTM C 1115; and of profile and hardness required to maintain watertight seal.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM or silicone gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.

2.7 GLAZING SEALANTS

A. General:
   1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they contact, including plastic glazing products 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.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; 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; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

   1. AAMA 804.3 tape, where indicated.
   2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
2.9 MISCELLANEOUS GLAZING MATERIALS

A. Compatibility: Provide products of material, size, and shape complying with requirements of manufacturers of plastic glazing 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: EPDM or silicone as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.

D. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5- to 10-psi compression strength for 25 percent deflection.

2.10 FABRICATION

A. Sizes: Fabricate plastic glazing to sizes required for openings indicated. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with plastic glazing manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plastic glazing framing, with glazing Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Minimum required face or edge clearances.
3. Effective sealing between joints of plastic glazing framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.
3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publication.

B. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.

C. Sand or scrape cut edges of plastic glazing to provide smooth edges, free of chips and hairline cracks.

D. Remove burrs and other projections from glazing channel surfaces.

E. Protect plastic glazing surfaces from abrasion and other damage during handling and installation, according to the following requirements:
   1. Retain plastic glazing manufacturer's protective covering or protect by other methods according to plastic glazing manufacturer's written instructions.
   2. Remove covering at border of each piece before glazing; remove remainder of covering immediately after installation where plastic glazing is exposed to sunlight or where other conditions make later removal difficult.
   3. Remove damaged plastic glazing sheets from Project site and legally dispose of off-site. Damaged plastic glazing sheets are those containing imperfections that, when installed, result in weakened glazing and impaired performance and appearance.

F. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

G. Install elastomeric setting blocks in sill channels, sized and located to comply with referenced glazing publication, unless otherwise instructed by plastic glazing manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

H. Provide edge blocking to comply with referenced glazing publication unless otherwise instructed by plastic glazing manufacturer.

I. 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.

J. Square cut wedge-shaped gaskets at corners and install gaskets as recommended in writing by gasket manufacturer to prevent corners from pulling away; seal corner and butt joints with sealant recommended by gasket manufacturer.
3.4  TAPE GLAZING

A. Install tapes continuously, but not in one continuous length. Do not stretch tapes to make them fit opening.

B. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

C. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant recommended by tape manufacturer.

D. Do not remove release paper from tape until immediately before each lite is installed.

E. Apply heel bead of glazing sealant.

F. Center plastic glazing 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.

G. Apply cap bead of glazing sealant over exposed edge of tape.

3.5  GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended in writing by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between plastic glazing and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center plastic glazing 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 plastic glazing. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6  CLEANING AND PROTECTION

A. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash plastic glazing according to plastic glazing manufacturer's written instructions.
B. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

C. Wash plastic glazing on both faces before date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Wash plastic glazing according to plastic glazing manufacturer's written instructions.

END OF SECTION 08 84 00
SECTION 08 88 16
VISION CONTROL GLASS – INTEGRAL BLINDS

PART 1 - GENERAL

1.1 SECTION INCLUDES
Sealed integral blind systems for glazing of hollow metal, aluminum, wood, or plastic laminate, Doors/frames/windows.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATION
Section 07 92 00 - Caulking & sealants
Section 08 11 13 – Hollow Metal Doors and Frames
Section 08 14 16 – Flush Wood Doors

1.3 PERFORMANCE REQUIREMENTS
Must meet owner’s approval and requirements. Maximum/minimum heights and widths determined at design stage. Minimum width of any IE; Blind unit shall be eight inches. Controls must be capable of being dual sided, and adjustable to meet height requirement and function. Units must be fully assembled and sealed upon shipment from manufacturer.

1.4 SUBMITTALS
A. Product Data: Submit manufacturer's product data and standard details.
B. Shop Drawings: Submit shop drawings for the fabrication, installation and associated components of the work. Include anchors, hardware and other components not included in manufacturer's standard data.

1.5 OPERATION AND MAINTENANCE DATA
Spare parts lists and owner’s manual are available from manufacturer.

1.6 QUALIFICATIONS
Company specializing in manufacturing the products specified in this section. Company which specializes in the installation and assembly of sealed integral blind systems and glass and glazing. Only systems which carry the United States Patent No. 7201205 and Canadian Patent No. 2,465,968 will be acceptable.

1.7 WARRANTY
Pariluse LLC’s components are warranted to be free of defects in materials or workmanship under normal use for a period of ten years from the date of
shipment from Pariluse LLC, unless otherwise specifically noted and agreed upon. For expanded warranty terms see Pariluse LLC’s warranty certificate.

Abuse, misuse, modification or improper repair or service by unauthorized technicians negates this warranty. During the period of this warranty Pariluse LLC at its sole option, will repair or replace component or parts there of found to be defective in material or workmanship. Return charges are prepaid. Components repaired or replaced under this warranty are warranted only for the remainder of the period covered by this warranty.

**PART 2 - PRODUCTS**

2.1 MANUFACTURER

Provide sealed integral blind systems, per the specification and design requirements as manufactured by: **Pariluse LLC**, 14750 Hwy. 64 Ben Wheeler, TX 75754 Contact: Jennifer George at Pariluse, LLC 866 267-1917. [www.ieblinds.com](http://www.ieblinds.com).

A Installer: Only approved installers for above manufactured and patented products will be acceptable.

2.2 EQUIPMENT

STEEL FRAMES:
Steel frames requiring IE; Blinds System are fabricated by frame manufacturers. Provided by others. See plans for fire rating requirements.

2.3 BLINDS

Provide manufactured microblinds and accessories. Assembled and integrated with tempered glass, sealants, and controls; by Pariluse LLC. Only direct drive, single or dual side controls will be acceptable. ADA Control knob design location(s) and blind slat color to be selected by architect.

2.4 GLASS AND GLAZING

A. Provide fully tempered, sealed, clear glass units for glazing, where integral blinds occur. Glazed integral blind unit(s) to be sealed at perimeter by the manufacturer. Overall unit thickness – 1-5/8” with Clear Tempered glass on each side of blind and fire rated glass – type Ultra 45.

B. Provide Lexan glass at Secure Treatment Rooms. Lexan shall be 1/4” thick where integral blinds occur. Units shall be sealed at perimeter by manufacturer. Overall unit thickness – 1-1/4”.

2.5 FINISHES

Primed finish by frame manufacturer. Primed frame painted in field per architects selection.

**VISION CONTROL GLASS – INTEGRAL BLINDS**

08 88 16- 2
PART 3 - EXECUTION

3.1 EXAMINATION

Verify the openings are plumb and are dimensioned properly. Insure adequate support has been provided at the header. Proceed with the installation only after conditions are deemed satisfactory.

3.2 INSTALLATION & ADJUSTMENT

Install blind system(s) in accordance with manufacturer’s installation instructions. Adjust equipment per instructions and local codes.

END OF SECTION 08 88 16
SECTION 08 91 10
GLAZED ALUMINUM CURTAIN WALL
(Reliance) HURRICANE RESISTANT

PART 1 - GENERAL

1.1 SUMMARY
A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.
B. Section Includes:
   1. Aluminum curtain wall systems complete with reinforcing, shims, anchors and attachment devices.
   2. Accessories necessary to complete Work.
C. Products Furnished but Not Installed Under this Section: Inserts and anchoring devices, which are to be built into structure.
D. Related Sections:
   1. Section 01 45 00 - Windstorm Construction Requirements
   2. Section 05 50 00 - Metal Fabrications.
   3. Section 06 10 53 - Miscellaneous Rough Carpentry.
   4. Section 07 21 10 - Thermal Insulation.
   5. Section 07 27 00 "Air Barriers" for materials used to bridge between glazed aluminum curtain walls and building intersection.
   6. Section 07 84 00 "Fire Stopping" for fire resistive material installed between glazed aluminum curtain walls and floor intersections.
   7. Section 07 92 00 “Joint Sealants” for joint sealants installed as part of the glazed aluminum curtain walls system.
   8. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts - Interior".
   9. Section 08 42 29.13 "Sliding Automatic Entrances".
   10. Section 08 71 00 - Door Hardware.
   11. Section 08 80 00 - Glass and Glazing.

1.2 SYSTEM REQUIREMENTS
A. General Standard: In addition to requirements shown or specified, comply with applicable provisions of Miami-Dade County Protocol TAS-201, TAS-202 and TAS-203, ASTM 1996 and 1886 and the Aluminum Curtain Wall Design Guide Manual for design, materials, fabrication and installation of component parts.
B. Design Requirements: Based on specific project design load requirements.

1. Metal stick framed systems with interior and exterior exposed metal framing.
2. System manufacturer shall provide low profile entrance frames as an integral part of the curtain wall system.
3. System manufacturer shall provide curtain wall systems, including necessary modifications to meet specified requirements and maintaining visual design concepts.
4. Fabricate glazing systems for exterior glazing at vision areas and exterior glazing at spandrel areas.
5. Perimeter conditions shall allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer’s recommended joint design.
6. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
7. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
8. Do not assume glass, sealants, and interior finishes contribute to framing member strength, stiffness, or lateral stability.
9. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
10. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
11. System shall drain to exterior face of wall, water entering joints and condensation occurring within system by drain holes and gutters of adequate size to evacuate water without infiltration to interior or the top of lower lites of glass.
12. Provide concealed fastening.
13. Metal faces are required to be visually flat under all lighting conditions, subject to acceptance of Architect.
14. Provide uniform color and profile appearance at components exposed to view.
15. Provide pre-punched pressure plates to ensure correct quantity and spacing of fasteners.

C. Performance Requirements:

1. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.02 cfm per square foot of surface area when tested in accordance with Miami – Dade County Building Code Compliance Office (BCCO) protocol (TAS-202), Florida Building Code HVHZ (TAS-202) and ASTM E 283 at differential static pressure of 6.24 psf.
2. Water infiltration: No uncontrolled leakage when tested in accordance with Miami – Dade County Building Code Compliance Office (BCCO) protocol (TAS-202), Florida Building Code HVHZ (TAS-202) and ASTM E331 at test pressure of 15 psf.

D. Thermal Requirements:

1. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.
2. Ensure doors function normally within limits of specified temperature range.
E. Hurricane Resistance Requirements
1. Large Missile Impact per Miami – Dade County Building Code Compliance Office (BCCO) protocol (TAS-201), Florida Building Code HVHZ (TAS-201) and ASTM E 1996
2. Cyclic Load Test per Miami – Dade County Building Code Compliance Office (BCCO) protocol (TAS-203), Florida Building Code HVHZ (TAS-203) and ASTM E 1886 test requirements.
4. See Section 01 45 00 Windstorm Construction Requirements for wind load requirements. Installation of units shall be in accordance with Product Evaluation CWSF-23, effective March 1, 2016 for Texas Department of Insurance.

F. Structural Requirements, as measured in accordance with ANSI/ASTM E330:
1. Wind loads for exterior assemblies:
   a. Basic loading:
      1) +100 Maximum psf acting inward for Reliance Wet-Glazed Option
      2) -100 Maximum psf acting outward for Reliance Wet-Glazed Option
      3) +70 Maximum psf acting inward for Reliance Dry-Glaze Option
      4) -70 Maximum psf acting outward for Reliance Dry-Glaze Option
   b. See Section 01 45 00 Windstorm Construction Requirements and Structural General Notes for project specific minimum requirements.


1.3 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Product Data:
1. Submit manufacturer's descriptive literature for each manufactured products.
2. Include information for factory finishes, accessories and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for selection.

C. Shop Drawings:
1. Submit drawings indicating elevations, detailed design, dimensions, member profiles, joint locations, and arrangement of units, member connections, and thickness of various components.
2. Show following items:
   a. Details of special shapes.
   b. Reinforcing.
   c. Drainage details and flow diagrams.
   d. Anchorage system.
   e. Interfacing with building construction.
   f. Provisions for system expansion and contraction
   g. Thermal breaks.

GLAZED ALUMINUM CURTAIN WALL
08 91 10- 3
4. Indicate glazing details, methods, locations of various types and thickness of glass and internal sealant requirements.

5. Clearly indicate locations of exposed fasteners and joints for Architect's acceptance.

6. Clearly show where and how manufacturer's system deviates from Contract Drawings and these Specifications.

D. Samples:
   1. Submit manufactures samples indicating quality of finish in required colors.
   2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
   3. Submit samples of structural glazing gaskets, 12-inch lengths.
   4. Submit samples of sealants for color selection.

E. Test Reports: Submit certified copies of previous tests reports by independent laboratory substantiating performance of system. Include other supportive data as necessary.
   1. Submit manufacturer's certification stating that installed system is in compliance with specified requirements

I. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

J. Warranty: Submit specified warranties.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Provide curtain wall systems that are products of a single manufacturer.

B. Engineer Qualifications: Professional Structural Engineer registered in State of Texas.

C. Installer Qualifications: Certified in writing by system manufacturer as qualified for specified systems.

1.5 PREINSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Division 01 requirements.

B. Conference Purpose and Agenda:
   1. Arrange with Architect and representatives of window and sealant manufacturer to visit Project site before beginning glazing operations to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
   2. Discuss following items:
      a. Weather conditions under which work will be done.
      b. Anticipated frequency and extent of joint movement.
      c. Joint design.
      d. Glazing procedures.
1.6 DELIVERY, STORAGE, AND HANDLING
   A. Comply with requirements of Section 01 60 00.
   B. Protect finished surfaces to prevent damage.
   C. Do not use adhesive papers or sprayed coatings, which become firmly bonded when exposed to sun.
   D. Do not leave coating residue on surfaces.

1.7 PROJECT CONDITIONS
   A. Ensure ambient and surface temperatures and joint conditions are suitable for installation of materials.

1.8 WARRANTY
   A. Provide warranties in accordance with Section 01 77 00.
   B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
   C. Warranty shall cover following:
      1. Complete watertight and airtight system installation within specified tolerances.
      2. Glass and glazing gaskets will not break or "pop" from frames due to design wind, expansion or contraction movement or structural loading.
      3. Glazing sealants and gaskets will remain free from abnormal deterioration or dislocation due to sunlight, weather or oxidation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS
   A. Subject to compliance with requirements indicated, provide products by one of the following:
      1. Oldcastle BuildingEnvelope®, Terrell, TX.
   B. Substitutions: Submit under provisions of Section 01 25 00, a minimum of 10 days prior to bid date.
   C. Oldcastle BuildingEnvelope® curtain wall systems included in this section are as follows:
Reliance IMPACT-RESISTANT SYSTEM - 2-1/2” x 7-1/2” mullion profiles; pressure glazed, front set, exterior glazed, stick wall system; available with vertical structural glazed mullion option, structural sealant-glazed and dry-glazed full gasket option; accommodates 1-1/4” and 1-5/16” laminated glass.

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
   1. ASTM B221, alloy 6063-T6 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
   2. Minimum thickness of 0.940 inch for framing members and 0.050 inch for glazing stops and similar components.

B. Internal Reinforcing:
   1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
   2. Shapes and sizes to suit installation.
   3. Shop coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Inserts and Anchorage Devices:
   1. Manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars or tubes.
   2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
   1. Non-magnetic stainless steel or cadmium plated steel coated with yellow or silver iridescence plating, compatible with materials being fastened.
   2. Series 300 stainless steel for exposed locations. Cadmium plated steel with 0.0005 inch plating thickness and color chromate coated for concealed locations.
   3. Provide nuts or washers of design having means to prevent disengagement; deforming of fastener threads is not acceptable.
   4. Provide concealed fasteners wherever possible.
   5. For exposed locations, provide countersunk flathead fasteners with finish matching item fastened.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Shims: Non-staining, non-ferrous, type as recommended by system manufacturer.

G. Protective Coatings: Cold applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

H. Glazing Gaskets:
   1. Compression type design, exterior replaceable, extruded EPDM. Interior is dense EPDM gasket.
2. Comply with ASTM C509 or C864.
3. Profile and hardness as necessary to maintain uniform pressure for watertight seal.
4. Manufacturer's standard black color.

I. Internal Sealants: Types recommended by system manufacturer to remain permanently elastic, tacky, non-drying, non-migrating and weather-tight.

J. Curtain Wall Insulation and Fire Safing: Refer to Sections 07 21 00.

2.3 GLASS AND GLAZING ACCESSORIES

A. Refer to Section 08 80 00.

2.4 SYSTEM FABRICATION

A. Take accurate field measurements to verify required dimensions prior to fabrication.

B. Location of exposed joints are subject to Architect's acceptance.

C. Provide dense EPDM continuous to separate exterior and interior aluminum framing members from being in contact with each other.

D. Fabricate components in accord with approved shop drawings. Remove burrs and ease edges. Shop fabricate to greatest extent practicable to minimize field cutting, splicing, and assembly. Disassemble only to extent necessary for shipping and handling limitations.

E. Steel Components:
1. Clean surfaces after fabrication and immediately prior to application of primer in accord with SSPC-SP2 or SSPC-SP3 at manufacturer's option.
2. Apply specified shop coat primer in accord with manufacturer's instructions to provide 2.0 minimum dry film thickness.

F. Fabricate components true to detail and free from defects impairing appearance, strength or durability. Fabricate custom extrusions indicated and as necessary for complete installation.

G. Fabricate components to allow for accurate and rigid fit of joints and corners. Match components carefully ensuring continuity of line and design. Ensure joints and connections will be flush and weather tight. Ensure slip joints make full, tight contact and are weather tight.

H. Reinforce components as required at anchorage and support points, at joints, and at attachment points for interfacing work.

I. Provide structural reinforcing within framing members where required to maintain rigidity and accommodate design loads.

J. System design and sealants to accommodate internal weep and drainage system not visible.
K. Head and sill extrusions act as gutter and weep water to exterior; do not penetrate sections with fasteners.

L. Allow for adequate clearance around perimeter of system to enable proper installation and for thermal movement within system.

M. Separate dissimilar metals with protective coating or preformed separators to prevent contact and corrosion.

2.5 FINISH

A. Clear Anodized:
   2. Architectural Class I, etched, medium matte, clear anodic coating, 0.7 mil minimum thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 01 40 00.

B. Verify dimensions, tolerances, and method of attachment with other Work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and applicable provisions of AAMA Aluminum Curtain Wall Design Guide Manual.

B. Align assemblies plumb and level, free of warp or twist, aligning with adjacent Work.

C. Tolerances:
   1. Limit variations from plumb and level:
      a. 1/8 inch in 20'-0" vertically and horizontally.
      b. 1/4 inch in 40'-0" either direction.
   2. Limit offsets in theoretical end-to-end and edge-to-edge alignment:
      a. 1/16 inch where surfaces are flush or less than 1/2 inch out of flush and separated by not more than 2 inches.
      b. 1/8 inch for surfaces separated by more than 2 inches.
   3. Step in face: 1/16 inch maximum.
   5. Location: 1/4-inch maximum deviation of any member at any location.
   6. Tolerances are not accumulative.

D. Provide attachments and shims to permanently fasten system to building structure.
E. Anchor securely in place, allowing for required movement, including expansion and contraction.

F. Separate dissimilar materials at contract points, including metal in contact with masonry or concrete surfaces, with protective coating or preformed separators to prevent contact and electrolytic action.

G. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

H. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

I. Do not apply mullion covers until building is closed in, roofing is installed and no alkaline substances can be washed from building onto curtain wall system.

J. Glazing:
   1. Install glazing gaskets and sealants in accordance with manufacturer's instructions without exception, including surface preparations. Refer to Section 08 80 00 for additional requirements.

K. Fire Safing and Curtain Wall Insulation:
   1. Install fire safing and curtain wall insulation specified in Section 07 21 00.

3.3 CLEANING

A. Clean surfaces in compliance with manufacturer’s recommendations; remove excess mastic, mastic smears, and other foreign materials.

B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 08 91 10
SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
   2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

B. Related Requirements:
   1. Section 050400 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For dimpled steel studs and runners, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.
   1. Steel Studs and Runners:
      a. Minimum Base-Metal Thickness: 0.033 inch.
      b. Depth: As indicated on Drawings.
   2. Dimpled Steel Studs and Runners:
      a. Minimum Base-Metal Thickness: 0.025 inch.
      b. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:
   1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: 0.033 inch.

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.
   1. Depth: 1-1/2 inches.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.033 inch.
   2. Depth: 7/8 inch.

G. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
   1. Configuration: Asymmetrical or hat shaped.
H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges.
   1. Depth: 3/4 inch.
   2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
   3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch wide flanges.
   1. Depth: 2-1/2 inches and 1-1/2 inches.

E. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
      a. Minimum Base-Metal Thickness: 0.033 inch.

F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. USG Corporation - Drywall Suspension System
      b. Armstrong Commercial Ceilings – Drywall Grid System

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 **PREPARATION**

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.

2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 **INSTALLATION, GENERAL**

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

E. Z-Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure 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 suspension system.
   a. 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 locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16
SECTION 09 24 00

CEMENT PLASTERING

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. Exterior vertical plasterwork (stucco).
   2. Exterior horizontal and non-vertical plasterwork (stucco).

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For each type of factory-prepared finish coat and for each color and texture specified.

D. Samples for Initial Selection: For each type of factory-prepared finish coat and for each color and texture specified.

E. Samples for Verification: For each type of factory-prepared finish coat and for each color and texture specified, 12 by 12 inches, and prepared on rigid backing.
1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for each substrate and finish texture indicated for cement plastering, including accessories.
   a. Size: 32 sq. ft. in surface area.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

2.2 METAL LATH


B. Paper Backing: FS UU-B-790a, Type I, Grade D, Style 2 vapor-permeable paper.
   1. Provide paper-backed lath at exterior locations.

2.3 ACCESSORIES

A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

   a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
   b. Smallnose cornerbead with perforated flanges; use on curved corners.
   c. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
   d. Bullnose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.
5. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.
9. J-Weep High Back (JWP): 3-1/2” high, J-shaped square nosed trim manufactured from 26 gauge galvanized steel, 1-3/8” ground designed for use with 1” of insulation.
10. Casing Bead – 1-1/4”: Fabricated with zinc protective finish (galvanized steel. The #66 SF is used where an expanded flange is not required. Available with or without weep holes.
11. Sill Screed: SI36 installed at juncture of sill and exterior concrete foundation to allow trapped moisture or water to drain to exterior of building. Minimum 26 gauge, G60 galvanized.
2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.

C. Bonding Compound: ASTM C 932.

D. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

2.5 PLASTER MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I.

B. Masonry Cement: ASTM C 91, Type N.

C. Plastic Cement: ASTM C 1328.

D. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

E. Sand Aggregate: ASTM C 897.

F. Perlite Aggregate: ASTM C 35.

   1. Color: As selected by Architect from manufacturer's full range.

2.6 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.
   1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.
B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:
   a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
   b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

2. Masonry Cement Mixes:
   a. Scratch Coat: Mix 1 part masonry cement and 2-1/2 to 4 parts aggregate.
   b. Brown Coat: Mix 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

3. Portland and Masonry Cement Mixes:
   a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
   b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

4. Plastic Cement Mixes:
   a. Scratch Coat: Mix 1 part plastic cement and 2-1/2 to 4 parts aggregate.
   b. Brown Coat: Mix 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

5. Portland and Plastic Cement Mixes:
   a. Scratch Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
   b. Brown Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: Use 1 part masonry cement and 1-1/2 to 3 parts aggregate.
3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

4. Plastic Cement Mix: Use 1 part plastic cement and 1-1/2 to 3 parts aggregate.

D. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

E. Flexible Tile and Stone Mortar: When plaster is concealed and used as a substrate for thin applied face brick, provide finish coat of ‘ARDEX X 5’ Flexible Tile and Stone Mortar for use in installation of thin applied face brick. Follow manufacturer’s recommendation for substrate preparation, priming/treatment.

1. Provide sample of installation with thin applied face brick for approval. Sample should include expansion joint detail through assembly.

**PART 3 - EXECUTION**

### 3.1 EXAMINATION

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

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

### 3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

### 3.3 INSTALLING METAL LATH

A. Metal Lath: Install according to ASTM C 1063.

2. Flat-Ceiling and Horizontal Framing: Install flat-diamond-mesh lath.

### 3.4 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External (Outside) Corners:
1. Install cornerbead at exterior locations.
2. Install cornerbead at interior locations.

C. Control Joints: Locate as approved by Architect for visual effect and as follows:
   1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
      a. Vertical Surfaces: 144 sq. ft.
      b. Horizontal and Other Non-vertical Surfaces: 100 sq. ft.
   2. At distances between control joints of not greater than 18 feet o.c.
   3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
   4. Where control joints occur in surface of construction directly behind plaster.
   5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C 926.
   1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:
   1. Portland cement mixes.
   2. Masonry cement mixes.
   3. Portland and masonry cement mixes.
   5. Portland and plastic cement mixes.

C. Ceilings; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork and having 3/4-inch total thickness for metal lath as follows:
   1. Portland cement mixes.
   2. Masonry cement mixes.
   3. Portland and masonry cement mixes.
5. Portland and plastic cement mixes.

D. Plaster Finish Coats: Apply to provide finish to provide appropriate substrate for thin faced masonry brick.

E. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

3.6 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 24 00
SECTION 09 29 00

GYPSUM BOARD

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. Interior gypsum board.
   2. Exterior gypsum board for ceilings and soffits.
   3. Tile backing panels.
   4. Rigid Extruded Polystyrene Composite Building Panel
   5. Texture finishes.

B. Related Requirements:
   1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
   2. Section 092216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
   3. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
   1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.
   2. Textured Finishes: 24” x 24” for each textured finish indicated and on same backing indicated for Work. Provide a minimum of three (3) types of finish samples.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential
causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

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

1. CertainTeed Corporation.
2. Georgia-Pacific Building Products.
3. National Gypsum Company; Gold Bond Brand Fire-Shield Wallboard, Gold Bond Brand Gypsum Wallboard, Gold Bond Brand XP Wallboard, High Strength Brand Ceiling Board, ProForm Brand All Purpose Joint Compound, drying type.
4. Temple-Inland Building Products by Georgia-Pacific.
5. United States Gypsum Company.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

2.4 SPECIALTY GYPSUM BOARD

A. Acoustically Enhanced Gypsum Board: ASTM C 1396/C 1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.
   1. Core: 5/8 inch, regular type; 5/8 inch, Type X.
   2. Long Edges: Tapered.

B. Impact-Resistant Gypsum Board: ASTM C 1629/C 1629M.
   1. Core: 5/8 inch, regular type, 5/8 inch, Type X.
   2. Surface Abrasion: Meets or exceeds Level 3 requirements.
   3. Surface Indentation: Meets or exceeds Level 3 requirements.
   7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Georgia-Pacific Building Products; Dens-Glass Gold.
   2. Core: 5/8 inch.
2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:
   c. US Gypsum, DUROCK

2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Glass-Mat, Water-Resistant Backing Board with Water-Resistant Coating: ATTM C 1178 / C1178M.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum LLC; “DensShield Tile Backer” or comparable manufacturer.
   2. Core: 5/8 inch, Type X.

2.7 RIGID EXTRUDED POLYSTYRENE FOAM BUILDING PANEL

A. Description: Rigid extruded polystyrene foam building element panel, with reinforcement material and polypropylene fleece webbing laminated on both sides.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Schluter –KERDI-BOARD, provided by Schluter Systems.
4. Prefabricated Accessories:
   a. Prefabricated stainless steel profiles and accessories designed to fasten and stabilize structures made of KERDI BOARD Panels.
   b. Prefabricated Schluter-KERDI_BOARD Profiles:
      1) Provide with corresponding stainless steel profiles.
   c. Corners:
      1) Provide with matching outside corners.
      2) Provide with matching connectors.
   d. Fasteners:
      1) Provide with matching anchors.
      2) Provide with matching washers and screws for stud framing.
   e. Reinforcing Tape:
      1) Provide matching reinforcing joint tape.

2.8 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:
   a. Cornerbead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   f. Expansion (control) joint.
   g. Curved-Edge Cornerbead: With notched or flexible flanges.

   1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
   2. Shapes:
      a. Cornerbead.
      b. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Fry Reglet Corporation.
      b. Pittcon Industries.
      c. Gordon Inc.
   2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, ASTM B 221M, Alloy 6063-T5.
   3. Finish: Shall be chosen from Manufacturer’s standard paint finish selections.

2.9 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use all-purpose compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Exterior Applications:
1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:
1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.10 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. At exterior conditions, use stainless steel screws complying with requirements of Windstorm construction and approved by structural engineer for type of screw and spacing.
2. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
3. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Refer Section 072100 “Thermal Insulation.”
E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Manufacturers’ Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Accumetric LLC, Boss 824 Acoustical Sound Sealant.
      b. Grabber Construction Products, Acoustical Sealant GSC.

F. Thermal Insulation: As specified in Section 072100 “Thermal Insulation.”

2.11 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      c. USG Corporation, BEADEX FasTex Wall and Ceiling Spray Texture.
   2. Texture: Fine Orange Peel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch wide joints to install fire/acoustical sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: As indicated on Drawings.
   2. Type X: As indicated on Drawings at all rated walls.
   3. Ceiling Type: As indicated on Drawings.
   4. Glass-Mat Interior Type: As indicated on Drawings.

B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

   1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

   1. Cornerbead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges.
   3. L-Bead: Use where indicated.
   4. U-Bead: Use at exposed panel edges.
D. Exterior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile and where indicated on Drawings.
   3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

   4. Level 5: Where indicated on Drawings.
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.9 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00
SECTION 09 30 00

EXTERIOR TILE, MASONRY & STONE MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. Work performed under the requirements of this section shall be subject to all conditions set forth under PART 1 “GENERAL CONDITIONS” as applicable to this portion of the work.

B. This is an overall guide specification for the installation of ARDEX Tile & Stone Installation Systems.

C. Complete ARDEX product and system installation details are provided in their corresponding Technical Brochure available at www.ardex.com.

1.2 REFERENCES

A. AMERICAN NATIONAL STANDARDS INSTITUTE (A.N.S.I.) at www.ansi.org
   1. A-118.3 Chemical resistant, water cleanable tile setting and grouting epoxy
   2. A-118.4 Fast-setting latex thin-set mortar and latex Portland cement mortar
   3. A-118.9 Cementitious backer units (C.B.U.)
   4. A-118.10 Thin, load bearing waterproofing membrane
   5. A-118.11 EGP latex Portland cement mortar.
   6. A-118.12 Crack Isolation Membrane
   8. A-108.17 Installation of Crack Isolation Membrane

B. TILE COUNCIL OF NORTH AMERICA, INC.

1.3 SUBMITTALS

A. Product data: submit manufacturer’s technical information and installation instructions for all specified materials.

B. SAMPLES - Prior to commencing the work, submit for approval four (4) representative tile samples of each type, finish and color mounted on a 1/2” (12mm) EXTERIOR grade plywood using the specified mortar and grouted with the specified grout. These samples shall be of current production, properly identified, clean and representative of the appearance of the finished work.

1.4 QUALITY ASSURANCE

A. Provide all setting materials and grouts from one source. Additives,
installation materials and grouts shall be from the same manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle tiles in a manner to prevent chipping, breakage, staining or any other damage.

B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes. Do not stir any frozen material until completely thawed.

C. Provide heated and dry storage facilities on site.

D. Deliver and store all materials on site at least 24 hours before work begins.

1.6 SITE CONDITIONS

A. Maintain environmental conditions and protect work during and after installation. Comply with trade standards and manufacturer’s printed instructions.

B. Turn off all forced ventilation and radiant heating systems and protect the work against drafts during installation and for at least 72 hours after completion.

C. When necessary, build a temporary shelter and use indirect auxiliary heaters to maintain an adequate temperature level in the working environment.

D. Exhaust temporary heaters to exterior to prevent damage to the work from carbon dioxide emanations.

E. Maintain temperature in tile areas at not less than 50°F (10°C) or more than 95°F (35°C) during installation and for at least 7 days after completion, unless otherwise indicated in the product instructions and/or in ANSI A108 installation standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. TILES or STONE: (Specify Size, Thickness, Pattern, Design and Manufacturer as required.

B. SETTING MATERIALS


EXTERIOR TILE, MASONRY & STONE MATERIAL

09 30 00 - 2
C. ACCESSORIES

1. ARDEX 8+9™ Waterproofing / Crack Isolation-Bridging Compound
2. ARDEX MC Moisture Control Systems (RAPID / PLUS / ULTRA)
3. ARDEX FLEX CAULK™

D. GROUTING MATERIALS

1. ARDEX FLEX Sanded™ Grout (28 colors)
2. ARDEX FLEX Unsanded™ Grout
3. ARDEX WA™ Epoxy Grout and Adhesive

E. MORTAR MATERIALS

1. ARDEX X5 – Flexible Tile and Stone Mortar

2.2 MIXING FOR SETTING AND GROUTING MATERIALS

A. Mix setting and grouting materials in strict accordance with manufacturer’s printed instructions.

B. Use clean mixing containers.

C. Use only potable water.

D. For best results, mix with an ARDEX T-2 Ring Paddle and 1/2” heavy-duty drill.) NO SLAKE TIME IS REQUIRED!

2.3 SPECIAL CONDITIONS: (See Notes to Specifier)

A. In areas that cannot be closed to traffic for any length of time, install tiles with a fast-setting material and grout with a fast-setting grout.

B. When installing large size tiles, nominal size 16”x16” (400x400 mm) and larger, use a special medium-bed mortar trowel (3/4” x 9/16”) (19mmx14mm) U-shaped) and install using a medium-bed mortar.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Before work commences, examine the areas to be covered and report any deficiency or adverse condition in writing to the general contractor and the architect. Do not proceed with the work until surfaces and conditions comply with the requirements indicated in the manufacturer’s instructions and in ANSI A108.5 and A108.6 specifications. For more details see “TCA HANDBOOK FOR CERAMIC TILE INSTALLATION.”

3.2 SURFACE PREPARATION
A. GENERAL
   1. All supporting surfaces shall be structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 1/8" in 8'-0" (3mm in 2,4m) for walls and 10'-0" (6mm in 3m) for floors. (See TCA HANDBOOK and ANSI Guidelines for details). They shall be clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, form release agent or any deleterious substance and debris which may prevent or reduce adhesion.
   2. Mechanically sand, shot blast or scarify the substrate to completely remove all paint, loosely bonded topping, loose particles and construction debris. When sanding or scarifying surfaces that may contain silica sand, use an approved dust mask. Surfaces containing asbestos must be handled in accordance with current EPA regulations. Contact your local EPA office.
   3. All concrete areas that are not flat, smooth and at the proper elevation shall be repaired using ARDEX AM 100™ Pre-Tile Repair Mortar, ARDEX TL 1000 or ARDEX TL 700.
   4. All wood substrates that are not flat and smooth shall be repaired using ARDEX TL WOOD.
   5. All substrates shall be dry.
   6. In all cases, the structural design of the floor shall not allow a deflection greater than 1/360 of the span under live and dead loads.
   7. For indoor applications over substrates such as metal, glass, solidly bonded non-porous coatings, existing ceramic tiles and other similar substrates, prime with ARDEX P-82 Ultra Prime.

B. CEMENTITIOUS BACKER UNITS (C.B.U.)
   1. When installed by others, the C.B.U. shall be from a reputable manufacturer and shall conform to the quality standard requirements of ANSI A118.9. It must be installed according to the C.B.U. manufacturer’s instructions and in strict accordance with ANSI A108.11 standard for INTERIOR INSTALLATION OF CEMENTITIOUS BACKER UNITS.

C. EXTERIOR WALL SURFACES
   1. Apply a coat of waterproof membrane or, when surface waterproofing is not required, a thin smoothing coat of the setting mortar approximately 1/16" (1.5mm) to 1/8" (3mm) thick to cover the entire concrete, masonry or C.B.U. substrate. Allow to dry and cure for at least 24 hours prior to installing thin set tiles. (See the respective data sheets for details)

3.3 INSTALLATION

A. On interior wall installation, use a notched trowel with deep enough grooves to achieve an 80% minimum mortar contact with the back side of the tiles. (Edges and corners shall be fully backed with mortar when set).

B. In all wet areas, exterior work and traffic floors, back butter each tile with a sufficient mortar layer, using the flat edge of the trowel immediately
prior to laying, to achieve a 100% mortar contact and a void-free solid support. Simultaneously apply the mortar to the substrate surface with a notched trowel with deep enough grooves to achieve a continuous bed without voids or unsupported areas. Lay tiles while both mortar surfaces are wet. Do not allow mortar to dry or skin over on either surfaces before laying the tiles.

C. For Large Size Tile Installation, 16”x16” (40x40cm) and larger and when medium-bed mortar is required, use a specially designed medium-bed trowel with 3/4” (19mm) wide x 9/16” (14mm) deep notches to gauge the setting material.

D. Install tiles in accordance with the mortar manufacturer’s strict instructions and following the general office outline procedure set forth in ANSI A108.5 SPECIFICATIONS FOR THE INSTALLATION OF CERAMIC TILES.

E. On walls, start installing at eye level when using Ardex non-sag thin set mortars. No tile supports, wedges, pegs, or ropes are required to prevent sagging.

F. On interior floors and walls, install tiles leaving a regular even spacing between tiles of at least 1/8” (3mm) and a maximum of 5/8” (15mm) (specify joint width desired). NO BUTT JOINTS SHALL BE PERMITTED.

G. On all the exterior portion of the work, install tiles leaving a regular even spacing between tiles of at least 3/16” (5mm) (specify joint width if wider joints are desired). NO BUTT JOINTS SHALL BE PERMITTED.

H. In areas where tiles are specified to be grouted with a chemical resistant epoxy grout, install tiles with a regular even spacing between tiles of at least 3/16” (5mm) to a maximum of 3/8 inch. (Specify the desired joint width) NO BUTT JOINTS SHALL BE PERMITTED.

3.4 EXPANSION AND CONTROL JOINTS

A. Carry existing joints in the concrete subfloors and walls through the covering surfaces.

B. Install control joints where tiles about restraining surfaces, around the perimeter of the work and at the base of columns and curbs.

C. Install and space expansion and control joints in all directions in accordance with the Tile Council of America Detail #EJ-171 recommendations, as described in the latest edition of the TCA HANDBOOK FOR CERAMIC TILE INSTALLATION, CAUTION: CONTROL JOINTS: Under no circumstance shall control joints be cut in after the tiles have been installed. Install tiles up to the control joint and stop. If required, cut the tile and resume setting from the opposite side of the joint. Before continuing, rake the joint clean.
D. Install an approved compressible bead and sealant to caulk expansion and control joints. Follow the sealant manufacturer's installation instructions.

3.5 GROUTING

A. Except where tiles are installed with a fast-setting material, grout wall tiles no sooner 8 hours and floor tiles no sooner than 24 hours after installation.

B. Where tiles are installed with a fast-setting material, grout wall tiles no sooner than 1-3 hours, and floor tiles no sooner than 3-5 hours after installation.

C. On floors and walls where joints are specified to be up to 3/16”, use ARDEX FLEX UNSANDED stain-resistant, water repellent grout.

D. On floors and walls where joints are specified to be up to 1/2”, use ARDEX FLEX SANDED fast setting, water repellent, flexible grout.

3.6 CLEANING

A. Excess grout should be removed from the face of the tile as work proceeds using the rubber float in “snow plow” fashion. Allow the grout to set firmly in the joints, and then dampen the entire area with a minimal amount of water.

B. Allow dampened grout to stand for one minute, and then wipe tile face repeatedly with clean sponge face.

C. Any dry film remaining on the tile surface can easily be removed by finishing or polishing with a damp terry cloth or similar pad after the grout has hardened in the joints.

3.7 PROTECTION

A. Protect finished work from weather, freezing and complete water immersion for at least 21 days after completion of the work.

B. Floors: protect floors from foot traffic for at least 24 hours and general traffic for at least 72 hours after installation. Prohibit heavy traffic on floors for at least 7 days after installation.

C. Walls: protect walls from impact, vibration and hammering on adjacent and opposite walls for at least 14 days after installation.

D. Since temperature and humidity during and after installation affect the final curing time of all cement-based and epoxy materials, allow for extended periods of cure and
protection when temperatures drop below 60°F (15°C) and/or when the relative humidity is higher than 70%.

**END OF SECTION 09 30 00**
SECTION 09 30 13
CERAMIC TILING

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. Porcelain tile.
2. Tile backing panels.
3. Waterproof membrane.
4. Edge strips.

B. Related Requirements:
1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.


C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:
   1. Full-size units of each type and composition of tile and for each color and finish required.
   2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
   3. Full-size units of each type of trim and accessory for each color and finish required.
   4. Edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product.

B. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
   2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installer is a five-star member of the National Tile Contractors Association.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
3. Installer employs installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

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

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Waterproof membrane.
3. Schluter Trim pieces.
   a. Wall Trim (TR-1)
      1) Series: RONDEC-DB
      2) Finish: AE Satin anodized aluminum.
   b. Floor Trim (TR-2)
      1) Series: RENO-U
      2) Finish: AE Satin anodized aluminum.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
   1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. Ceramic Tile: CT-1 (Floor)
   b. Portfolio
   c. Color: Iron Grey, PF06
   d. Face Size: 12 inch X 24 inch.
   e. Note: Install in 1/3 running bond laid
      1) Color: 35 Mocha

B. Ceramic Tile: CT-2 (Wall Tile)
   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. Basis-of-Design: Daltile
      b. Volume 1.0
      c. Color: Aural Sand, VL77
C. Ceramic Tile: **CT-3**

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. Basis-of-Design: Daltile
   b. Pattern: Stone Radiance
   c. Color: Kinetic Khaki Blend #SA50
   d. Size: 5/8 inch random mosaic.
      1) Color: 23 Antique White

D. Porcelain Tile: **PTF-1** (Floor)

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. Basis-of-Design: Daltile
   b. Series: Portfolio
   c. Color: PF08 Chocolate
   d. Size: 12 inch by 24 inch
   e. Grout: Laticrete Spectralock
      1) Color: 35 Mocha

E. Porcelain Tile: **PTB-1** (Base)

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. Basis-of-Design: Daltile
   b. Series: Volume 1.0
   c. Color: Aural Sand VL77
   d. Size: Cove Base 6 inch by 12 inch
   e. Grout: Laticrete Spectralock
      1) Color: 23 Antique White

F. Porcelain Tile: **PTW-1** (Wall Tile)

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. Basis-of-Design: Daltile
   b. Series: Volume 1.0
   c. Color: Aural Sand VL77
   d. Size: 12 inch by 24 inch
G. Porcelain Tile: **PTW-2** (Wall Tile)

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. Basis-of-Design: Daltile
   b. Series: Stone Radiance
   c. Color: Kinetic Khaki Blend SA50
   d. Size: 5/8 inch by Random Mosaic
   e. Grout: Laticrete Spectralock
      1) Color: 23 Antique White

H. Quarry Tile Type: Unglazed square-edged quarry floor tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Suretread or a comparable product by one of the following:
   a. American Olean; a division of Daltile Corporation
   b. Quarry Tile Co.
   c. Face Size: 6 inch X 6 inch.
   d. Thickness: 3/8 inch.
   e. Wearing Surface: Suretread surface.
   f. Dynamic Coefficient of Friction: Not less than 0.42.
   g. Finish: Mat, Opaque glaze.
   h. Tile color and Pattern: As selected by Architect from manufacturer's full range.
   i. Grout Color: As selected by Architect from manufacturer's full range.
   j. Trim Units: Coordinate with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
      1) Base: Surface, bullnose, coved, module size same as adjoining flat tile.

2.4 **THRESHOLDS**

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

2. Threshold: Thorton Tile and Marble Threshold
2.5 TILE BACKING PANELS

A. Cementitious Backer Panels: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. US Gypsum, DUROCK

2. Thickness: 5/8”.

2.6 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane
      b. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane
      c. MAPEI Corporation; Mapelastic AquaDefense Premium Waterproofing and Crack-Isolation Membrane
      d. Merkrete, Parex USA Company, Hydro Guard 2000

2.

2.7 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar(Thinset): ANSI A118.1. (Masonry Walls)
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Custom Building Products.
      b. Laticrete International, Inc.
      c. MAPEI Corporation.
   2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

B. Latex-Portland Cement Mortar (Thinset): ANSI A118.4. (Cement board Walls)
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Custom Building Products.
      b. Laticrete International, Inc.
      c. MAPEI Corporation.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

2.8 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Custom Building Products.
      b. Laticrete International, Inc.
      c. MAPEI Corporation.

B. Grout for Pregrouted Tile Sheets: Same product used in factory topregrout tile sheets.

2.9 MISCELLANEOUS MATERIALS

A. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

B. Metal Edge Strips: Height to match tile and setting-bed thickness; anodized aluminum exposed-edge material
   1. Products: Subject to compliance with requirements, provide the following:
      a. Schluter System L.P.; Schluter-RONDEC.
      b. See plans for additional information on style and finish.

C. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

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.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
3. 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.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
   a. Tile floors consisting of tiles 6 by 6 inches or larger.
   b. Tile floors in wet areas.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer’s standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

2. Quarry Tile: 3/8 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).
2. Do not extend waterproofing under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

L. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3.7 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:
   1. Tile Installation: TCNA F113; thinset mortar.
      a. Tile Type: See finish schedule.
      c. Grout: Water-cleanable epoxy grout.
   2. Tile Installation: TCNA F116;
      a. Tile Type: See finish schedule.
      b. Grout: Water-cleanable epoxy grout.
   3. Ceramic Tile Installation at Toilet Rooms: TCNA F122; thinset mortar on waterproof membrane.
      a. Ceramic Tile Type: See finish schedule.
      c. Grout: water-cleanable epoxy grout.
   4. Tile Installation: TCNA F132; water-cleanable, tile-setting epoxy on cured cement mortar bed
      a. Tile Type: See finish schedule.
      b. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Metal Studs or Furring:
   1. Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board over vapor-retarder membrane.
      a. Tile Type: See finish schedule.
      c. Grout: Water-cleanable epoxy grout.
2. Ceramic Tile Installation at Toilet Rooms: TCNA B415; thinset mortar on waterproof membrane over cementitious backer units or fiber-cement backer board.
   
   a. Ceramic Tile Type: See finish schedule.
   c. Grout: Water-cleanable epoxy grout.

END OF SECTION 09 30 13
SECTION 09 50 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Selections

1. Section 09 20 00 - Gypsum Board
2. Divisions 23 - HVAC Air Distribution
3. Division 26 - Electrical

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect’s review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters’ Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
   A. Armstrong Fire Guard Products
10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
13. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code


D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures


   1. ESR 1308 - Armstrong Suspension Systems
H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report.

   1. 0244 - Armstrong Single Span Suspension System


1.4 SYSTEM DESCRIPTION

Continuous/Wall-to-Wall.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

   1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

   2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.
3. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

B. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units 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 ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.8 PROJECT CONDITIONS

A. Space Enclosure:

HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.9 ALTERNATE CONSTRUCTION WASTE DISPOSAL

A. Ceiling material being reclaimed must be kept dry and free from debris

B. Contact the Armstrong Recycle Center a consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant with provide assistance to facilitate the recycling of the ceiling.

1.10 WARRANTY
A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping

2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:

1. Acoustical panels: Ten (10) years from date of substantial completion.

2. Grid: Ten (10) years from date of substantial completion.

3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is Thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.11 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL
A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system form single source from single manufacturer.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

c. Acoustical Panel Standard: Provide manufacturer’s standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
   1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ATM E 795.

2.3 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following:
   1. Armstrong World Industries, Inc.
   2. Certain Teed Corporation
   3. Chicago Metallic Corporation
   4. USG Interiors, Inc. Subsidiary of USG Corporation

B. Suspension Systems:
   1. Armstrong World Industries, Inc.
   2. Certain Teed Corporation
   3. Chicago Metallic Corporation
   4. USG Interiors, Inc. Subsidiary of USG Corporation

C: Perimeter Systems
   1. Armstrong World Industries, Inc.

2.4.1 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type ACT-1
   2. Classification: Provide panels complying with ASTM E1264 for type, form and pattern as follows:
      a. Type and Form: Type III, mineral base with painted finish: Form 2, water felted.
      b. Pattern: CDE (perforated, small holes, fissured and lightly textured).
   3. Color: White
   4. Modular Size: 24INCH x 24INCH
   5. Edge Profile: Trim Square with 15/16" Exposed Tee grid.
   6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.55.
   7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on
2.4.2 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type **ACT-2**

2. Classification: Provide panels complying with ASTM E1264 for type, form and pattern as follows:
   a. Type and Form: Type III, ceramic bonded mineral base with painted finish: Form 2, water felted.
   b. Pattern: CDG (perforated, small holes, fissured and lightly textured).
3. Color: White
4. Modular Size: 24INCH x 24INCH
5. Edge Profile: Trim Square with 15/16" Exposed Tee grid.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.50.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton 40.
8. Thickness: 5/8 INCH.
9. Board Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer’s standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G21.
10. LR: Not less than 0.84.

2.4.3 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type **ACT-3**

2. Classification: Provide panels complying with ASTM E1264 for type, form and pattern as follows:
   a. Type and Form: Type III, ceramic bonded mineral base with painted finish: Form 2, water felted.
   b. Pattern: CDG (perforated, small holes, fissured and lightly textured).
3. Color: White
4. Modular Size: 24INCH x 24INCH
5. Edge Profile: SLT Tegular with 9/16" Exposed Tee grid.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.70.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton 35.
8. Thickness: 3/4INCH.
9. Board Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer’s standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G21.
10. LR: Not less than 0.85.

2.5. METAL SUSPENSION SYSTEMS - GENERAL

A. Metal Suspension-System Standard: Provide manufacturer’s standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C635/C 635M.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635?C 635M, Table 1, Direct Hung unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1, “Direct Hung”) will be less than yield stress of wire, but provide not less than 0.106 inch diameter wire.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04 inch thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation, with bolted connections and 5/16 inch diameter bol

2.5. METAL SUSPENSION SYSTEMS – GENERAL

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc.
2. Certain Teed Corp.
3. Chicago Metallic/Rockfon, Subsidiary of Rockwool International A/S.

B. Metal Suspension System for ACT-1 Acoustical Panels
   1. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-
dip galvanized according to ASTM A 653/A 653M, G60 coating designation; with prefinished, cold-rolled, 15/16 inch wide aluminum caps on flanges.
   a. Structural Classification: Heavy-Duty System.
   b. Face Design: Flat, flush.

C. Metal Suspension System for **ACT-2** Acoustical Panels
   1. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized according to ASTM A 653/A 653M, G60 coating designation; with prefinished, cold-rolled, 15/16 inch wide aluminum caps on flanges.
      a. Structural Classification: Heavy-Duty System.
      b. Face Design: Flat, flush.

Retain “Clean-Room Gasket System” Paragraph below if required. Verify, with manufacturers, product availability and compatibility of gasket type with panels and suspension system. Indicate location on Drawings or by inserts.

D. Metal Suspension System for **ACT-3** Acoustical Panels
   1. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized according to ASTM A 653/A 653M, G60 coating designation; with prefinished, cold-rolled, 9/16 inch wide aluminum caps on flanges.
      a. Structural Classification: Heavy-Duty System.
      b. Face Design: Flat, flush.
      c. Cap Material: Steel cold-rolled sheet.

2.6. METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Armstrong World Industries, Inc.
   2. Certain Teed Corp.
   3. Chicago Metallic/Rockfon, Subsidiary of Rockwool International A/S.
   4. USG Interiors, Inc. Subsidiary of USG Corporation.

B. Edge Moldings: Manufacturer’s standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed. Provide reveal end wall angle where noted.
   1. White baked-enamel finish.

A. Perimeter Pockets: Manufacturer’s ceiling transition to perimeter wall to conceal blinds, shades, screens or ceiling transition heights. Provide two-piece extruded aluminum pocket trim by Gordon Interior Specialties Division.
   1. Two –Piece Trim pieces HCPA-75 & VCPA-40 with integral splice/hanger.
   2. Pre-finished: Finish to match grid manufacturers pre-finished cap color.
2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: Manufacturer’s standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.


PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant with provide assistance to facilitate the recycle of the ceiling.

END OF SECTION 09 50 00
SELECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

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. Resilient base.
2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
C. Product Schedule: For resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.  Furnish not less than 10 linear feet for every 480 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
3. Flexco
4. Johnsonite; A Tarkett Company.
5. Nora Systems, Inc.
6. Roppe Corporation, USA

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

2. Style and Location:
   a. Style B, Cove.

C. Rubber Base: RB-1

1. Manufacturer: Roppe
2. Color: Fig 125
3. Type: Cove Toe
4. Height: 4 inches.

D. Lengths: Coils in manufacturer's standard length.
E. Outside Corners: Preformed.

F. Inside Corners: Job formed or preformed.

2.2 RUBBER MOLDING ACCESSORY.

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into Work included, but are not limited to, the following:
   
   1. Roppe Corporation, USA.

B. Description: Rubber carpet edge for glue-down applications, reducer strip for resilient flooring, joiner for tile and carpet, and transition strips.

C. Profile and Dimensions: As required and approved by Architect.

D. Locations: Provide rubber molding accessories in areas where transitions occur between different floor finishes as indicated on interior finish plan.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Preformed Corners: Install preformed corners before installing straight pieces.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
   a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
   a. Miter or cope corners to minimize open joints.
3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13
SECTION 096516
RESILIENT SHEET FLOORING

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 vinyl sheet flooring.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of flooring. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.

C. Samples: For each exposed product and for each color and texture specified in manufacturer’s standard size, but not less than 6-by-9-inch sections.
   1. For heat-welding bead, manufacturer’s standard-size Samples, but not less than 9 inches long, of each color required.

D. Samples for Initial Selection: For each type of resilient sheet flooring indicated.

E. Samples for Verification: In manufacturer’s standard size, but not less than 6-by-9-inch sections of each different color and pattern of resilient sheet flooring required.
   1. For heat-welding bead, manufacturer’s standard-size Samples, but not less than 9 inches long, of each color required.

F. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient sheet flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

G. Product Schedule: For resilient sheet flooring. Use same designations indicated on Drawings.
1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Sheet Flooring: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for resilient sheet flooring including integral base and accessories.

   a. Size: Minimum 20 sq. ft. for each type, color and pattern in locations directed by Architect.

   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by
manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient sheet flooring during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during resilient sheet flooring installation.

D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.

E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 HOMOGENOUS SHEET FLOORING

A. Products: Subject to compliance with requirements, provide the following:
   1. Mannington Commercial, Biospec MD, Mfr # 15203.


C. Thickness: 0.080 inch.

D. Sheet Floor: **SHF-2**
   1. Manufacturer: Mannington
   2. Series: Biospec MD
   3. Color: Sandrift 15203
   4. Size: 6”-6” wide roll
5. Welding Rod: To Match

E. Sheet Floor: **SHF-3**
   1. Manufacturer: Mannington
   2. Series: Biospec MD
   3. Color: Bedrock 15369
   4. Size: 6'-6" wide roll


G. 4 inch or 6 inch integral base where schedule.

2.3 SOLID VINYL FLOOR

A. Products: Subject to compliance with requirements, provide the following:
   1. Burke Flooring; Luxury Vinyl Tile.
   2. Mannington; Luxury Vinyl Tile.

B. Tile Standard: ASTM F 1700.
   2. Type: B, embossed surface.

C. Luxury Vinyl Tile: **LVT-1**
   1. Manufacturer: Mannington
   2. Series: Nature’s Path
   3. Color: Windsor Oak, Moleskin

D. Luxury Vinyl Tile: **LVT-2**
   1. Manufacturer: Mannington
   2. Series: Color Anchor
   3. Color: Stride, Milk Thistle

E. Luxury Vinyl Tile: **LVT-3**
   1. Manufacturer: Mannington
   2. Series: Nature’s Path
   3. Color: Windsor Oak, Shore

2.4 UNBACKED RUBBER SHEET FLOORING

A. Products: Subject to compliance with requirements provide the following:
   1. Teknoflor: Timerscapes.

   1. Type (Binder Content): Type I, minimum binder content of 90 percent.
   2. Wear-Layer Thickness: Grade 1.
   3. Overall Thickness: As standard with manufacturer.
4. **Back up Class:** Class B – Fused backing system of 0.080” content PVC layer, fiberglass, PVC internal layer, polyester mesh back.

C. **Sheet Floor: SHF-1**
   1. Manufacturer: Teknoflor
   2. Series: Timberscapes
   3. Color: Southern Oak 53802
   4. Size: 2.3 MM thick, 5’-11” wide by 75 foot roll
   5. Welding Rod: To Match

D. **Sheet Floor: SHF-4**
   1. Manufacturer: Teknoflor
   2. Series: Urbanscapes
   3. Color: Union Square
   4. Size: 2.3 MM thick, 5’-11” wide by 75 foot roll
   5. Welding Rod: To Match

E. **Sheet Floor: SHF-5**
   1. Manufacturer: Teknoflor
   2. Series: Urbanscapes
   3. Color: Chelsea
   4. Size: 2.3 MM thick, 5’-11” wide by 75 foot roll
   5. Welding Rod: To Match

F. **Warranty:** Provide manufacturer’s 12 year wear limited warranty.

### 2.5 INSTALLATION MATERIALS

A. **Trowelable Leveling and Patching Compounds:** Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. **Adhesives:** Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

C. **Seamless-Installation Accessories:**
   1. **Heat-Welding Bead:** Manufacturer's solid-strand product for heat welding seams.

D. **Integral-Flash-Cove-Base Accessories:**
   1. **Cove Strip:** 1-inch radius provided or approved by resilient sheet flooring manufacturer.
   2. **Cap Strip:** Square metal, vinyl, or rubber cap provided or approved by resilient sheet flooring manufacturer.
   3. **Corners:** Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.
E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

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

3.2 PREPARATION

A. Prepare substrates according to resilient sheet flooring manufacturer’s written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer’s written recommendations, but not less stringent than the following:

   a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

### 3.3 RESILIENT SHEET FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

   1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:
   1. Remove adhesive and other blemishes from surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.
   1. Apply three coat(s).

E. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 09 65 16
SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile
   2. Adhesive and related accessories
   3. Surface-applied moisture mitigation and related products

B. Related Sections:
   1. Division 07 Section “Joint Sealants” for single-component and multi-component elastomeric, latex, silicone, urethane and other joint sealants.
   2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.
   3. Division 09 Section "Resilient Sheet Flooring" for resilient sheet floor coverings.

1.3 SEQUENCING

A. Install floor tile after other finishing operations, including painting, have been completed.

B. Install floor tile before installation of base cabinets.

1.4 ACTION SUBMITTALS

A. Submit items in accordance with Division 01 Section “Submittal Procedures.”

B. Product Data: For each type of product indicated, submit two (2) copies of manufacturers’ product data, installation instructions and accessories specified and/or required by manufacturer.

C. Shop Drawings: Submit Drawings for each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns, type, locations and direction. See sheet A711 of Finish Drawings.
2. Transition details to other flooring materials.

D. Samples for Verification: Submit two samples of each specified color of floor tile. If products other than those specified are proposed, provide a sample of the specified item with the proposed sample. Label samples with finish designations included on the Finish Legend (VCT-1, VCT-2, etc.) found on Finish Drawings. Submit samples in the following minimum sizes:

1. Tiles: 4 x 4 inch

E. Product Schedule: See Finish Material Listing in Finish Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile, provide maintenance manuals including manufacturers’ written instructions for cleaning and maintenance.

B. Manufacturers' warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Installer Qualifications: Concrete Vapor Sealer: Acceptable to manufacturer and employing factory-trained installers.

C. Contractor to schedule pre-installation conference with flooring sub-contractor, Architect/Interior Designer and Owner to review seaming diagrams, adhesives, floor preparation procedures, moisture mitigation procedures, bond/adhesion tests, and installation procedures.

D. Convene a pre-installation conference covering the work of this Section

1. Schedule the meeting at least one week prior to commencing the work of this Section, but not before:
   a. Submittals for the work of this Section have been approved by the Architect.
   b. The floor bond test specified below shows acceptable results.

2. Coincide the pre-installation conference with the construction of mock up
samples of flooring and review of submittals.

3. Require attendance of parties directly affecting the work of these Sections, including manufacturers’ representatives and installers of both the moisture mitigation system and the flooring. Notify the Architect of conference at least 7 days prior to meeting.

4. Review conditions of installation, installation procedures, and coordination required with related work. Use the following as a minimum agenda:

   a. Review specifications for flooring and mitigation systems
   b. Review approved submittals
   c. Review schedule
   d. Phasing and ordering of material
   e. Review installation procedures
   f. Inspect mockup(s) and review quality
   g. Review acceptability criteria of substrate, discuss problem floor areas
   h. Review acceptable environmental conditions
   i. Material storage and acclimation
   j. Verify acceptable trowels for each product
   k. Verify testing requirements: Bond tests, Calcium chloride tests, Alkalinity
   l. Review slab preparation requirements
      1) Shot blasting/scarifying
      2) Crack treatment
      3) Moisture mitigation installation
      4) Leveling - cement based
      5) Feathering/final prep - cement based
   m. No use of wax or oil based sweeping compound
   n. Protection and final cleaning

1.7 DELIVERY, STORAGE, AND HANDLING

   A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 PROJECT CONDITIONS

   A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
      1. 48 hours before installation.
      2. During installation.
      3. 48 hours after installation.

   B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 64 OR NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less the 0.45 W/sq. cm.

2. FloorSource Compliance: Resilient tile flooring shall comply with requirements of FloorSource Standard developed by the Resilient Floor Covering Institute (RFCI).

B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc.

2.3 VINYL COMPOSITION FLOOR TILE (VCT)

A. Products: Subject to compliance with requirements, Finish Material Listing for Basis of Design. Also see Preferred Vendor List for manufacturers that may be considered acceptable substitutions and must be submitted in accordance with Division 01 Section “Product Requirements.”

B. Tile Standard: ASTM F 1066

C. Wearing Surface: Smooth or embossed as per Finish Legend on sheet A712in Finish Drawings.

D. Size, Colors and Patterns: Allow up to 2 color selections from manufacturer’s standard color selections.
1. Trowelable Leveling and Patching Compounds: Portland cement-based or blended hydraulic cement-based formulation provided or approved by floor covering manufacturer for applications indicated. Products for manufacturers’ consideration are Armstrong S-184 or S-194 (leveling or patching), Ardex SP-F Feather Finish (patching), K-15 (leveling) or Concure Feather Cement (patching), SL-1 (leveling).

2. Moisture Mitigation Product (90% + RH) – Ardex Rapid MC, Concure Vapor Barrier Two-Step System; Concure Corporation, Collingdale, PA, Koster vapi 2000, or Stauf Moisture Mitigation.

3. Adhesives for concrete testing over 90% RH: Utilize a pre-applied, poly-acrylic adhesive system – Mannington QuickStix (LTV only); Mannington Commercial, Calhoun, GA. Or select approved alternate option:
   a. EnviroSTIX(all resilient flooring types); Base King, Dalton GA.
   B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated. ADD EPOXY ADHESIVE

   1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. VCT Adhesives: Not more than 50 g/L.
   
   C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content, moisture vapor emission, temperature, alkalinity, installation tolerance, moisture mitigation, and other conditions affecting performance of the Work.

B. At areas which require moisture mitigation, brush blasting, bead blasting, shot blasting, scarifying or other substrate preparation, consult with Architect and Structural Engineer prior to performing Work.

C. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer’s written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after all substrates pass testing.
   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of allowed / permissible by manufacturer(s) for each product specified in 24 hours.
   b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have the maximum relative humidity level measurement allowed by manufacturer(s) for each product specified.
   c. If required, apply the moisture mitigation product per the manufacturer’s recommendations and provide any additional calcium chloride testing of the prepared substrate per moisture mitigation manufacturer’s recommendations prior to installation of floor covering and register results with the moisture mitigation manufacturer, General Contractor, Owner and Architect.
5. After installation of vapor sealer and before flooring installation, conduct 72 - hour bond test to verify adhesion of each required type of flooring adhesive to concrete vapor sealer. Provide written report on such testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.
B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at
perimeter.

1. Lay tiles as indicated in Finish Drawings.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles as indicated in Finish Drawings.

D. Scribe, cut, seal and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

1. Install resilient flooring in epoxy adhesive unless otherwise indicated.

I. At areas receiving integral base, extend flooring material or pre-molded base up the wall to the height indicated on the drawings. Carefully miter corners and heat seal seams. The cut style at mitered corners must be consistent throughout entire project as approved at the pre-installation conference or as per approved mock-up.

1. Install integral base cover cap. Clean thoroughly and apply sealant between the cove cap and wall to bottom of door frame to floor. See Division 07 Section “Joint Sealants.”

J. Protect flooring installations and do not allow walking traffic for 24 hours or rolling loads for 72 hours after completion of installation to allow for setting and drying of adhesive.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
   1. Verify Manufacturer written instructions for floor polish. Floor polish is used with most VCT and some solid vinyl tile.
   2. Apply floor polish per manufacturer’s recommendation.

E. Joint Sealant: Apply sealant to resilient tile flooring at door frames and at other joints and penetrations.

F. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19
SECTION 09 66 13.16

MONOLITHIC TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Portland cement terrazzo flooring & base, monolithic installation with divider and accessory strips.

1.2 DEFINITIONS

A. NTMA: National Terrazzo and Mosaic Association, Inc.

1.3 PREINSTALLATION MEETINGS

A. Pre installation Conference: The General Contractor shall conduct a conference at project site before Terrazzo Contractor begins installation.
   1. The General Contractor shall invite Terrazzo Contractor, the Architect and representatives of the Owner.
   2. Review methods and procedures related to terrazzo including, but not limited to, the following:
      a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
      b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
      c. Review terrazzo mixes and patterns to match existing terrazzo finished.
      d. Coordination with the work of other installers.

1.4 ACTION SUBMITTALS

A. Product Data: Terrazzo Contractor shall submit Product Data for each type of product required for installation including:
   1. Strip materials.
   2. Sealer.
   3. Cement.

B. Samples:
1. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions.

2. Terrazzo Contractor shall prepare and submit a maximum of three samples each, sizes 6 by 6 inches for each color and type of terrazzo specified.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Terrazzo Contractor shall submit two copies of qualification data.
   1. Include list of projects indicating name and location of project, name of Owner, name and contact information for General Contractor, and name and contact information for Architect.
   2. Include letter from NTMA with the name of the Project and name of member, stating current member status.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Literature: Terrazzo Contractor shall submit two copies of NTMA maintenance recommendations.

1.7 QUALITY ASSURANCE

A. Acceptable Suppliers: A firm experienced in manufacturing products in accordance with NTMA standards and with a record of successful in-service performance, as well as sufficient production capacity to produce required materials.

B. Acceptable Terrazzo Contractor: A Contractor Member of NTMA whose work has resulted in construction with a record of successful in-service performance.
   1. Installer shall have completed terrazzo installations within the past 5 years of scale and complexity similar to the proposed installation.

C. Source Limitations for Aggregates: Terrazzo Contractor shall obtain each color, grade, type, and variety of granular materials from sources capable of providing materials of consistent quality in appearance and physical properties.

D. Mockups: Terrazzo Contractor shall construct mockup to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups of flooring and base approximately 12 inches long x 18 inches wide.
1.8 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to Project site in supplier's original wrappings and containers, labeled with source or manufacturer's name, material or product brand name and lot number if any.

B. Materials shall be stored in their original, undamaged packages and containers.

1.9 PROJECT CONDITIONS

A. General Contractor shall provide sufficient water, temporary heat and light, and adequate electric power with suitable outlets connected and distributed for use within 100 feet of any working space.

B. General Contractor shall provide temporary enclosures and other suitable methods to protect adjacent spaces from damage during installation.

1. Maintain ambient temperatures in the area to receive terrazzo at not less than 50 deg. F.
2. Maintain adequate ventilation in the area to receive terrazzo.

C. Terrazzo Contractor shall protect other adjacent work from water and dust generated by grinding operations.

1.10 GUARANTEE

A. One year from date of completion of terrazzo installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C 150, Type 1, as selected by Architect from NTMA standard-Terrazzo plates.

B. Water: Potable

C. Sand: ASTM C 33/C33M, clean, washed, and locally available

D. Marble Chips:

1. Size: NTMA gradation standards
2. Abrasion and Impact Resistance: Not more than 40 percent loss when tested in accordance with ASTM C 131
3. Chips shall contain no deleterious or foreign matter – match existing.

E. Divider Strips:

1. Material: Match existing.
2. Strip Thickness: 16 gauge
3. Type: “L” Strips, 1/2 inch
4. Heavy Top Thickness: Match existing
5. Depth: 1/2 inch

F. Colorants: Alkali-resistant color stable pigments.

G. Curing Materials: Water or polyethylene sheeting.

H. Isolation Membrane: Polyethylene sheeting, ASTM D 2103, Type 13300, 4 mils thick.

I. Expansion-Joint Strips: Brass, with removable zip-strip top for installing sealant.

2.2 MISCELLANEOUS ACCESSORIES

A. Sealer: Terrazzo Contractor shall provide a non-ambering, clear sealer that is chemically neutral; does not impair terrazzo aesthetics or physical properties; is recommended by terrazzo matrix manufacturer. Sealers shall comply with the following:

1. Comply with requirements of authorities having jurisdiction.
2. Comply with ASTM D 2047.
4. Solvent Based Sealer Properties: Flashpoint at 80 deg. F according to ASTM D 56.

2.3 MIXES

A. Terrazzo Selection: Terrazzo Contractor shall provide standard terrazzo mix(es) according to the following:

1. Custom Mix Color and Pattern:
   a. Color for Base: Cement Color: Color to be selected by Architect from NTMA standard-Terrazzo plates.
   b. Chips: Chip color and percent as selected by Architect.

B. Proportions for Terrazzo Topping: One 94-lb. bag of Portland cement per 150 lb. of marble chips, color pigment and sufficient potable water to produce a workable mix.

C. Mixing of Terrazzo Topping:

1. Charge and mix marble chips, portland cement, and color pigment if required.
2. Add water and mix to a uniform workable consistency.
PART 3 - EXECUTION

3.1 EXAMINATION
A. The General Contractor and Architect shall examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

1. Verify that concrete surfaces to receive monolithic terrazzo flooring are sound, free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with terrazzo flooring materials.

B. Terrazzo Contractor shall proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION
A. General Contractor shall broom clean area to receive terrazzo to remove loose chips and all foreign matter.

B. Terrazzo Contractor shall mechanically abrade concrete surface.

3.3 POURER-IN-PLACE TERRAZZO INSTALLATION
A. Strip Materials: Terrazzo Contractor shall install strip materials as follows:

1. Divider and Control Joint Strips:
   a. Locate divider strips in locations determined by Architect.
   b. Install control-joint strips back to back in locations indicated.
   c. Install strips in adhesive setting bed without voids below strips.

2. Accessory Strips: Install as required to provide a complete installation.

B. Placing Terrazzo:

1. Place terrazzo mixture in panels formed by divider strips and trowel mixture to top of strips.
2. Seeding of additional marble chips is optional.
3. Roll and compact surface until all excess cement and water has been extracted.
4. Trowel to a dense uniform flat surface disclosing lines of divider strips.
5. Abrasive Strips: Install with surface of abrasive strip positioned at a nominal 1/16 inch higher than terrazzo surface.

C. Curing: Terrazzo Contractor shall cure the terrazzo topping as follows:

1. After placing terrazzo and composition has sufficiently set, cover with water or polyethylene sheeting.
2. Cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.

D. Poured in Place Terrazzo Base: Terrazzo Contractor shall provide mix color for terrazzo base to match approved sample.
   1. Terrazzo Contractor shall place and finish terrazzo base at the same time the terrazzo floor is being installed.

E. Finishing: Terrazzo Contractor shall finish the terrazzo topping as follows:
   1. Rough Grinding: Grind with 24 or finer grit stones or with comparable diamond plates.
   2. Grouting:
      a. Cleanse floor with clean water and rinse.
      b. Remove excess rinse water and machine or hand-apply grout, taking care to fill voids.
   3. Cure Grout: Cure until grout is ready for fine grinding.
   4. Fine Grinding/Polishing: Grind with 120 grit stones or comparable diamond abrasives until all grout is removed from surface.

F. Terrazzo Cleaning: Terrazzo Contractor shall clean finished terrazzo as follows:
   1. Remove grinding residue from terrazzo surface.
   2. Wash terrazzo surfaces immediately after final grinding of terrazzo flooring with water and allow surfaces to dry thoroughly.

G. Sealing: Terrazzo Contractor shall seal terrazzo according to sealer manufacturer’s written instructions.

3.4 REPAIR
A. Terrazzo Contractor shall repair terrazzo areas that evidence lack of bond between topping and underbed according to NTMA’s written recommendations.

3.5 PROTECTION
A. After application of the sealer, the Work shall be ready for final inspection and acceptance by the Owner or his agent.
B. The General Contractor shall protect the finished floor after the Terrazzo Contractor has completed final grinding and applied sealer to terrazzo surfaces.

END OF SECTION 09 66 13.16
SECTION 09 67 26
RESINOUS FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Labor, products, equipment and services necessary for resinous flooring Work in accordance with the Contract Drawings covering the following components:
   .1 Primer: Sikafloor® 161.
   .2 1st Body Coat: Sikafloor® 216 W/ Broadcast Decorative Quartz to Rejection.
   .3 2nd Body Coat: Sikafloor® 216 W/ Broadcast Decorative Quartz to Rejection.
   .4 Top Coat: Sikafloor® 216.
   .5 Optional Top Coat: Sikafloor® 315.
   .6 Optional Top Coat: Sikafloor® 225N.
   .7 Optional Top Coat: Sikafloor® 510.

1.2 RELATED SECTIONS
A. Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCES
F. For additional standards please refer to Product Data Sheets.

1.4 SUBMITTALS
A. Comply with Section 01 33 00 - Submittal Procedures.
B. Product Data: Submit manufacturer’s product data, including physical properties and colors available.
C. Manufacturer’s Safety Data Sheet for each product being used.
D. Product Samples: Submit Architectural Standard samples representative of the final finish, as applied. The Standard shall be approved in writing by the Architect and shall be the final standard of acceptance of the finish.

E. Maintenance Instructions: Submit manufacturer’s maintenance instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

.1 Acceptable Manufacturer: Sika Corporation, 201 Polito Drive, Lyndhurst, NJ 07071

.1 No request for substitution shall be considered that would change the generic type of system specified. Equivalent materials of other manufacturers may be substituted only on approval of the Architect or Engineer. Requests for substitution will be considered only if submitted 10 days prior to bid date. Requests shall include the respective manufacturer’s technical literature for each product giving the name, generic type, descriptive information, recommended dry film thickness (DFT), Material Safety Data Sheet (MSDS), and certified test reports showing results to equal performance criteria of products specified herein.

B. Applicator Qualifications:

.1 Pre-Qualification: Each bidder for this project shall be pre-qualified and approved in writing by the material manufacturer.

.2 Applicator Experience: Each bidder must have a minimum 5 years experience in the application of the type of system specified. Contractor shall submit a list of five projects of similar size, scope and complexity.

C. Mock-Up:

.1 Construct one 100 sq.ft. (10 sq.m.) mock-up of each type and color of resinous flooring in location acceptable to Architect/Engineer to demonstrate quality of finished system, complying with manufacturer’s instructions.

.2 Arrange for Architect’s review and acceptance, obtain written acceptance before proceeding with Work.

.3 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section. Mock-up shall be left in place for the duration of the work.

D. Pre-application Meeting: Convene a pre-application meeting two (2) weeks before start of application of floor coating. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer’s representative. Review surface preparation, priming, application, curing, protection, and coordination with other work.
1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery:
   .1 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture.
   .2 Material should be delivered to job site and checked for completeness and shipping damage prior to job start.

B. Storage:
   .1 Store materials in accordance with manufacturer’s written instructions.
   .2 Keep containers sealed until ready for use. Material should be stored in a dry, enclosed, protected area from the elements.
   .3 Do not subject material to excessive heat or freezing.
   .4 Shelf life: Established based on manufacturer’s written recommendation for each material being used.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

D. Condition materials for use accordingly to manufacturer’s written instructions prior to application.

E. Record material lot number and quantity delivered to jobsite/storage.

1.7 SITE CONDITIONS

A. Do not install the Work of this Section outside of the following environmental ranges with Manufacturers’ written acceptance:
   .1 Material Temperature: Precondition material for at least 24 hours between 65° to 75°F (18° to 24°C)
   .2 Ambient Temperature: Minimum/Maximum 50°/85°F (10°/30°C)
   .3 Substrate Temperature: Minimum/Maximum 50°/85°F (10°/30°C). Substrate temperature must be at least 5°F (3°C) above measured Dew Point.
   .4 Mixing and Application attempted at Material, Ambient and/or Substrate Temperature conditions less than 65°F (18°C) will result in a decrease in product workability and slower cure rates.
   .5 Relative Ambient Humidity: Minimum ambient humidity 30%, maximum ambient humidity 75% (during application and curing)
   .6 Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.

B. Substrate moisture:
   .1 Moisture content of concrete substrate must be ≤ 4% by mass as measured with a Tramex® CME/CMExpert type concrete moisture meter.

RESINOUS FLOORING
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Additionally, relative humidity tests may be conducted per ASTM F2170 and values must be ≤ 85%.

If moisture content of concrete substrate is > 4% by mass as measured with Tramex® CME/CME Expert type and/or if relative humidity tests per ASTM F2170 exceed values > 85%, consider moisture mitigation systems or moisture tolerant primer.

C. Utilities, including electric, water, HVAC and permanent lighting to be supplied by General Contractor

D. Maintain constant ambient room temperature of plus or minus 15°F (plus or minus 7°C) with a minimum temperature of 50°F (10°C) and maximum temperature of 85°F (30°C). Maintain constant ambient room temperature for 48 hours before, during and after installation, or until cured. Do not apply while ambient and temperatures are rising.

E. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

F. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

G. Insure adequate ventilation and air flow.

1.8 WARRANTY

A. Manufacturer’s warranty covering the resinous flooring against defects in materials for one year from date of installation.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Manufacturer shall be certified under ISO 9001: 2008 All liquid materials, including primers, resins, curing agents, finish coats, and sealants are manufactured and tested under an ISO 9001:2008 registered quality system.

B. Approved Manufacturer shall be Sika Corporation, Industrial Flooring, 201 Polito Avenue, Lyndhurst, NJ 07071, Phone 201.933.8800, Fax 201.933.6225, www.sikafloorusa.com

2.2 SYSTEM

A. Resinous flooring system: Sikafloor Quartzite Broadcast System is a seamless, aesthetic, broadcast and sealed epoxy floor, composed of multicolored quartz aggregates finished with transparent top coats applied between 56 – 125 mils (1.3 – 3 mm) thick. System to consist of the following components:

.1 Primer: Sikafloor® 161 applied between 8 – 10 mils.
.2 1st Body Coat: Sikafloor® 216 W/ Broadcast Decorative Quartz to Rejection applied at 16 mils.

.3 2nd Body Coat: Sikafloor® 216 W/ Broadcast Decorative Quartz to Rejection applied at 16 mils.

.4 Top Coat: Sikafloor® 216 applied at 16 mils.

.5 Optional Top Coat: Sikafloor® 315 applied between 3 – 3.5 mils.

.6 Optional Top Coat: Sikafloor® 225N applied at 16 mils.

.7 Optional Top Coat: Sikafloor® 510 applied at 16 mils.

2.3 MATERIALS

A. Primer: Sikafloor 161 is a two part, epoxy resin for priming and leveling mortars with the following properties:

.1 Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.

.2 Shore D Hardness (ASTM D2240): 76 at 7 days.

.3 Solid Content: ~ 100% (by volume) / ~ 100% (by weight).

.4 VOC Content (ASTM D2369): ≤ 50 g/L.

.5 Permeability (ASTM E96): 9.0 g/m² (24 hours / +75°F).

.6 Water Absorption (ASTM D570): 0.14 g/h - m2.

.7 Viscosity (approximately) of Components A + B: 775 (SP2/100).

B. Body Coats and Top Coat: Sikafloor 216 is a low odor, 100% solids, epoxy resin coating system primarily designed for high build coatings and decorative quartz and flake applications. Sikafloor 216 may be used as a primer and may be in color selected by Architect with the following properties:

.1 Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.

.2 Shore D Hardness (ASTM D2240): 78 - 82 at 7 days.

.3 Solid Content: ~ 100% (by volume) / ~ 100% (by weight).

.4 VOC Content (ASTM D2369): ≤ 50 g/L.

.5 Compressive Strength (ASTM C579): 7,250 psi (50 N/mm²) at 28 days.

.6 Flexural Strength (ASTM C580): 2,900 psi (20 N/mm²) at 28 days.

C. Broadcast Aggregate: Decorative Quartz aggregate.

D. First Top Coat: Sikafloor 315 is a high solids, low VOC abrasion resistant, aliphatic polyurethane coating in color selected by Architect with the following properties:

.1 Pull-off Strength to Primed Concrete (ASTM D4541): > 400 psi (2.76 MPa) with 100% concrete failure.

.2 Hardness (ASTM D 3363 Pencil): 2H to 3H concrete failure.
.3 VOC Content (ASTM D2369): With Wear Aggregate ≤ 100 g/L, With Sikafloor Urethane Color Add Only ≤ 50 g/L.
.4 Tensile Strength (ASTM D2370): 2,882 psi.
.5 Elongation: 2.29.
.6 Abrasion Resistance (ASTM D4060): 0.01 - 0.02 grams (CS-17 Wheel, 1000 gm load, 1000 cycles).
.7 Coefficient Of Friction (ASTM D2047): 0.6 - 0.7.
.8 Slip Resistance: Equivalent to ASTM D2047 Passes.

E. Second Top Coat: Sikafloor 510 is a two-component, solvent-free, high solids, low-viscosity, high strength, polyaspartic resin system in clear color with the following properties:
   .1 Pull-off Strength (ASTM D1583): > 400 psi (2.7 MPa) with 100% concrete failure.
   .2 Shore D Hardness (ASTM D2240): 75.
   .3 VOC Content (ASTM D2369): ≤ 50 g/L.
   .4 Viscosity (approximately) of Components A + B: 850 cps.
   .5 Tensile Strength (ASTM C307): 6,500 psi.
   .6 Coefficient of Friction (ASTM D1894): 61T 0.8.

F. Cove base: Epoxy mortar cove based.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive flooring system. Notify Architect/General Contractor/Owner/Owner’s representative if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.

B. Surface must be clean, sound and dry. Remove dust, laitance, grease, curing compounds bond inhibiting impregnations, waxes and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.

C. Concrete substrate to have a minimum compressive strength of 3,500 psi (24 MPa) at 28 days and a minimum of 215 psi (1.5 MPa) in tension at time of application.

D. Substrate moisture:
   .1 Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.
.2 Confirm and record above values at least once every 3 hours during installation, or more frequently whenever conditions change (e.g. Ambient Temperature rise/fall, Relative Humidity increase/decrease, etc.).

E. Ensure concrete substrate conforms to the minimum requirements of the flooring manufacturer.

F. Flooring system shall not be applied to sand-cement setting beds. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.

G. Flooring system shall not be applied to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.

H. Application to glazed or vitrified brick and tile, structural wood, steel shall only be permitted with Manufacturer's written recommendation.

3.2 SURFACE PREPARATION

A. Prepare surface to receive flooring systems in accordance with manufacturer's written instructions.

B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants. Remove sealers, finishes, and paints. Remove unsound concrete by appropriate mechanical means.

C. Concrete: Shall be cleaned and prepared to achieve laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP level as per ICRI guidelines and manufacturer's written recommendation).

D. Chemical Surface Preparation: Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer's warranty.

E. Control joints and cracks: Provide repair and treatment of control joints and surface cracks utilizing manufacturer's standard materials and installation details.

3.3 APPLICATION

A. Mix and apply material with strict adherence to manufacturer’s written installation procedures and coverage rates.

B. Follow Manufacturer’s written recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.

C. Do not apply while ambient and substrate temperatures are rising.

D. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform color, sheen and texture, all within limitations of materials and areas concerned.
E. Match colors and textures of approved samples.
F. Install cove base 6 inch high with 1 inch radius in accordance with manufacturer’s written instructions.

3.4 CLEAN UP
A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION
A. Freshly applied material should be protected from dampness, condensation and water for at least 72 hrs.
B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc. may result in surface imperfections and other defects.
C. Follow manufacturer’s written recommendation with respect to cure, wait time and return to service.

3.6 FINISH SCHEDULE
A. Epoxy Flooring: (EP-1)
   1. Manufacturer: Sika
   2. Series: Sika Floor Quartzite
   3. Color: To be selected by Architect from full range of manufacturer’s available colors.

END OF SECTION 09 67 26
SECTION 09 68 13
TILE CARPETING

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 modular, tufted carpet tile.

B. Related Requirements:
   1. Section 096513 "Resilient Base and Accessories" & Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
      a. Review delivery, storage, and handling procedures.
      b. Review ambient conditions and ventilation procedures.
      c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:
   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch long Samples.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.9 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient
temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 CARPET TILE

A. Carpet Tile (CPT-1)

1. Manufacturer: Patcraft.

2. Series: Walk Forward

3. Color: Access, Passage


2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

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

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.
D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

   1. Remove yarns that protrude from carpet tile surface.
   2. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13
SECTION 09 72 16.16
RIGID-SHEET VINYL WALL COVERING

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. This section includes labor, materials and other services necessary to complete vinyl wall coverings.
B. Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

1.2 RELATED SECTIONS
A. Section 033000 - Cast-in-Place Concrete: Concrete finishing.
B. Section 061053 – Miscellaneous Rough Carpentry: Plywood floor sheathing.
C. Division 7 - Thermal and Moisture Protection.
D. Division 15 - Mechanical.

1.3 REFERENCES
A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
B. American Society for Testing & Materials (ASTM):
   1. ASTM E 84-17 - Standard Test Method for Surface Burning Characteristics of Building Materials. CLASS A
   2. ASTM D543-14 - Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents
C. International Organization for Standardization
   1. ISO 6603/1 E50 - Determination of puncture impact behavior of rigid plastics: Exceeds 94 Joules

1.4 SYSTEM DESCRIPTION
A. Performance Requirements: Provide hygienic Palclad Pro wall covering which has been manufactured by Palram Americas, Inc. and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.
1.5 SUBMITTALS

A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.

B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:
   1. Installer to submit a layout diagram indicating the location of each panel and joining method as per the requirements of this specification.

C. Samples: Submit duplicate sample pieces of Palclad Pro material, as well as accessory pieces in accordance with Section 01330 - Submittal Procedures.

D. Quality Assurance Submittals: Submit the following:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.
   3. Manufacturer's Field Reports: Specified herein.

E. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in installing PVC panels (not fiber reinforced plastic) for a minimum of 5 years and who has specialized in installation of work similar to that required for this project.

B. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.
1. Mock-Up Size: 24 inch x 24 inch.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

C. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE & HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver, store and handle Palclad Pro wall panels in accordance with Section 01610 - Basic Material Requirements.

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

E. Store panels in temperature controlled environments. Leave protective film on panel until ready to use.

1.8 WASTE MANAGEMENT AND DISPOSAL

A. Deposit all packaging materials in appropriate container on site for recycling or reuse.

B. Avoid using landfill waste disposal procedures when recycling facilities are available.

C. Keep all discarded packaging away from children.

1.9 PROJECT CONDITIONS

A. Temperature Requirements: If storage temperature is below 65F (18C), the Palclad Pro wall panel must be moved to a warmer place and allowed to reach this temperature before installation. For further information, refer to current Installation Guide.

B. Maintain air temperature and structural base temperature at installation area between 65F (18C) and 80F (26C) for 48 hours before, during and 24 hours after installation.

1.10 WARRANTY
A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

C. Warranty Period for Palclad Pro shall be 20 years commencing on Date of Sale of material.

1.11 EXTRA MATERIALS
A. Provide extra materials of product and adhesives in accordance with Section 017700 - Closeout Submittals.

B. Provide 2 sq.ft. of each color, pattern and type material required for project for maintenance use.

C. Clearly identify each wall panel and each container of adhesive.

D. Deliver to Consultant, upon completion of the work of this section and store where directed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturer (no substitutions)
   1. Palram Americas, Inc.
      9735 Commerce Circle, Kutztown, PA 19530
      Toll-free: 800.999.9549
      Fax: 610.285.9928
      E-mail: sales.usa@palram.com Web Site: www.palram.com/

2.2 HYGIENIC WALL COVERINGS
A. Palclad Pro™ is 100% pure vinyl, extruded, semi-rigid PVC sheet. Palclad Pro is homogenous.

B. Acceptable material: Palclad Pro™ (measurements and product weights
given below are approximate). Other colors available upon request, minimum order quantities will apply.

1. **Beige**: Thickness: 0.100" (2.5 mm); Panel Width: 4' (1.22m) Panel Height: 10' (2.4m or 3m); Weight 4' x 10' Panel: 28.8 lbs (13.1 kg).

### 2.3 ACCESSORIES

A. **Vinyl welding rod**: Supplied by Palram Americas, Inc.

B. A non-flammable water-based adhesive suitable for PVC wall panel installations with no solvents or VOC's for climate controlled areas or a two part resin based polyurethane adhesive for wet area, non-climate controlled areas and non-absorbent surfaces. As approved by the manufacturer.

### 2.4 SOURCE QUALITY

A. **Source Quality**: Obtain PVC wall panels from a single manufacturer.

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**PART 3 - EXECUTION**

### 3.1 MANUFACTURER’S INSTRUCTIONS

A. **Compliance**: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

### 3.2 EXAMINATION

A. **Site Verification of Conditions**: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

### 3.3 SUBSTRATE PREPARATION

A. Walls should be smooth and level. High points must be removed and low points filled with filler intended for the substrate and environmental conditions.

B. Wall tiles must be fixed firmly to the wall. As long as the tile edges do not protrude you do not have to skim grout joints.

C. Surfaces must be permanently dry and free from all substances that may contribute to adhesive bond failure.

D. Remove loose paint and conduct an adhesive bond test with paint.

E. Exterior walls must be adequately damp-proofed and insulated.

F. Dry wall substrates should be paint ready.
3.4 PREPARATION

A. All surfaces must be free from dust and cleaned prior to Palclad Pro installation. The working environment must also be dust free. Failure to comply with these conditions will reduce the bond strength between the adhesive and substrate, and may cause the Palclad Pro panels to debond.

B. Very absorbent / porous substrates (particularly plaster finishes and unprimed sheetrock) must have a sealer e.g. PVA primer or similar, applied to the surface a minimum of 12 hours prior to the installation.

C. All electrical switches, power points etc., should be in a first fix / installation state. All electrical equipment should only be moved or altered by a qualified electrician.

D. All plumbing should have pipe-work removed to a first fix or installation state and “tails” left protruding from the substrate. Palclad Pro panels can then be drilled and slid over the pipe tails. All holes should be drilled 1/8” (3mm) oversize to allow for expansion, then sealed with a compatible sanitary sealant. Plumbing should always be done by a qualified plumber.

E. Hot pipes and steam pipes should be insulated and a 1/8” to 1/4” (3-6mm) expansion gap should be created when installing panels around these pipes, then sealed with a compatible sanitary sealant.

F. All pipes, fixing bolts, etc. extending through the Palclad Pro panels should have a minimum 1/8” (3mm) expansion gap and be sealed using a compatible sanitary sealant.

G. If fitting to door frames, these must be in place prior to installation of Palclad Pro.

H. Prior to installation, it is advisable to complete any painting which comes in contact with Palclad Pro, as sealant used at junctions is non-paintable.

I. Panels should be stored flat and be pre-conditioned a minimum of 24 hours in ambient temperatures similar to the prevailing operational conditions.

J. The panels must be stored on a level flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.

K. Check the room using a 6’ (2 m) level to ensure all walls are flat, paying particular attention to the corners, window reveals, and door entrances. These need to be inspected to ensure they are free of any debris or irregularities, which could prevent the panels from lying flat to the
substrate after the adhesive has been applied and the panel installed.

3.5 INSTALLATION
A. Hygienic Wall Installation: Install Palclad Pro in accordance with the current published Palram Americas, Inc. Installation Guide. All joints should be joined by approved methods as detailed in the installation guide. Failure to install Palclad Pro in accordance with recommended procedures will void the Palram Americas, Inc. Limited Product Warranty.

3.6 CLEANING
A. Palclad Pro can be cleaned with a diluted soap/detergent solution. For stubborn stains use an alkaline cleaner compatible with PVC.
B. When cleaning the Palclad Pro surface, we recommend the temperature of water does not exceed 140° F (60° C).
C. Pressure cleaning with hot water may be used with the pressure nozzle a minimum of 2 feet (600mm) away from the surface.
D. To reduce the buildup of static, cleaning the panels with an anti-static solution is recommended.
E. Remove construction debris from project site and legally dispose of debris.

3.7 PROTECTION
C. Do not install near open heat sources (ovens, etc). Stainless steel panels should be used in such areas.

END OF SECTION 09 72 16.16
SECTION 09 91 13
EXTerior painting

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 surface preparation and the application of paint systems on exterior substrates.
   1. Concrete masonry units (CMU).
   2. Steel.
   4. Aluminum (not anodized or otherwise coated).
   5. Wood.

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.
1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches 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.

D. 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.
   3. VOC content.

1.5 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.7 QUALITY ASSURANCE

A. Mockups: Apply mockups 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. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional
      mockups of additional colors selected by Architect at no added cost to
      Owner.
3. Approval of mockups does not constitute approval of deviations from the
   Contract Documents contained in mockups unless Architect specifically
   approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become
   part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition
   in manufacturer’s original sealed containers, complete with labels and instructions
   for handling, storing, unpacking, protecting, and installing. Packaging shall bear the
   manufacture’s label with the following information:
   1. Product name and type (description).
   2. Batch date.
   3. Color number.
   4. VOC content.
   5. Environmental handling requirements.
   6. Surface preparation requirements.
   7. Application instructions.

B. 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.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air
   temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85
   percent; at temperatures less than 5 deg F above the dew point; or to damp or wet
   surfaces.

C. Hazardous Materials: It is not expected that hazardous materials will be
   encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb;
      immediately notify Architect and Owner.
   2.

PART 2 - PRODUCTS
2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
   1. PPG Architectural Finishes, Inc.

B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
   1. Manufacturer’s designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. 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.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by architect from manufacturer’s color selections.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
   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.

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 the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
   1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Wood: 15 percent.
      d. Portland Cement Plaster: 12 percent.
      e. Gypsum Board: 12 percent.
   2. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
   3. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

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. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer’s written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
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.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. 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.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed to view:
      a. Equipment, including panelboards and switch gear.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

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. Concrete Substrates, Pedestrian Traffic Surfaces:
   1. Latex Floor Paint System:
      a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
      b. Topcoat: Floor paint, latex, slip-resistant, low gloss: S-W ArmorSeal
         Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.
   2. Concrete Stain System (Water-based) for Vertical Surfaces:
      a. First Coat: Low-luster opaque finish matching topcoat.
      b. Topcoat: Low-luster opaque finish: S-W H&C Concrete Stain Solid Color
         Water Based, at 50 to 250 sq. ft. per gal.

B. CMU Substrates:
   1. Latex System:
      a. Block Filler: Block filler, latex, interior/exterior: S-W PrepRite Block
         Filler, B25W25, at 75 to 125 sq. ft. per gal.
         Series, at 4.0 mils wet, 1.5 mils dry, per coat.
   2. CMU Stain System (Water-based):
      a. First Coat: Low-luster opaque finish matching topcoat.
      b. Topcoat: Low-luster opaque finish: S-W H&C Concrete Stain Solid Color
         Water Based, at 50 to 250 sq. ft. per gal.

C. Masonry Plaster Substrate:
   1. Elastomeric System:
      a. S-W Loxon Acrylic Block Surfacer, LX01 Series
      b. Intermediate Coat: S-W ConFlex SherLastic Elastomeric Coating, CF16
         Series
      c. Topcoat: S-W ConFlex SHerLastic Elastomeric Coating, CF16 Series

D. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:
   1. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer, water-based, anti-corrosive for metal: S-W Pro
         Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils
         wet, 2.0 to 4.0 mils dry.
      b. Prime Coat: Shop primer specified in Section where substrate is
         specified.
      c. Intermediate Coat: Light industrial coating, exterior, water based,
         matching topcoat.
      d. Topcoat: Light industrial coating, exterior, water based, eggshell: S-W
         Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per
         coat.

E. Wood Substrates: Including exposed wood items not indicated to receive shop-
   applied finish.
   1. Latex System:
      a. Prime Coat: Primer, latex for exterior wood.
c. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

   1. Latex System:
      a. First Coat: Latex, exterior, matching topcoat.
      b. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 09 91 13
SECTION 09 91 23

INTERIOR PAINTING

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 surface preparation and the application of paint systems on interior substrates.
   1. Steel.
   2. Cast iron.
   4. Aluminum (not anodized or otherwise coated).
   5. Wood (not finished).

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.
E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches 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.

D. 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.
   3. VOC content.

1.5 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.7 QUALITY ASSURANCE
A. Mockups: Apply mockups 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. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. 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.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS
A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
   1. PPG Architectural Finishes, Inc.

B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
   1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. 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.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 150 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

INTERIOR PAINTING
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7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

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 the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   a. Concrete: 12 percent.
   b. Masonry (Clay and CMU): 12 percent.
   c. Wood: 15 percent.
   d. Gypsum Board: 12 percent.
   e. Plaster: 12 percent.

2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

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.

1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

1. SSPC-SP 2, "Hand Tool Cleaning."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. 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.

I. Aluminum Substrates: Remove loose surface oxidation.

J. 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 and to recommendations in "MPI Manual."
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.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. 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.

D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Uninsulated metal piping.
      b. Pipe hangers and supports.
      c. Tanks that do not have factory-applied final finishes.
   2. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Pipe hangers and supports.
      d. Metal conduit.
      e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      f. Other items as directed by Architect.
   3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for
testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

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 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

2. Water-Based Light Industrial Coating System:
   c. Topcoat: Light industrial coating, interior, water based, eggshell: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

B. Metal Substrates (Aluminum, Steel, Galvanized Steel):

1. Latex System:
a. Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.


2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.


c. Topcoat: Light industrial coating, interior, water based, semi-gloss: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

3. Acrylic/Alkyd System:

a. Prime Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.


C. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Latex System:


2. Acrylic/Alkyd System:

a. Prime Coat: Primer sealer, latex, interior: S-W Premium Wall & Wood Primer, B28W8111, at 4.0 mils wet, 1.8 mils dry.


3. Water-Based Light Industrial Coating System:
   c. Topcoat: Light industrial coating, interior, water based, eggshell: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."

D. Gypsum Board Substrates:

1. Latex System:
   c. Topcoat: Latex, interior, flat at ceilings: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
   d. Topcoat: Latex, interior, eggshell at walls: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

2. Water-Based Light Industrial Coating System:
   c. Topcoat: Light industrial coating, interior, water based, eggshell: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

**END OF SECTION 09 91 23**
SECTION 10 14 00

SIGNAGE

PART 1- GENERAL

1.1 Submittals: Submit the following as specified in Section 01 33 00 "Submittals":

A. Shop Drawings:
   1. Interior signage schedule.

B. Manufacturer's Data:
   1. Interior signage.

1.2 Manufacturer:

A. CC Stamp Works, Corpus Christi, Texas or approved equal.

B. New signs will match signage standard for CHRISTUS Spohn Hospital - South.

PART 2 - PRODUCTS

2.1 Interior Signage:

A. Plastic Laminate: 3/16" thick plastic laminate with 1/32" raised letters.

B. Sub-surface background with Front Surface Raised Letters: Minimum 1/8" thick clear matte acrylic sub-surface screen printed with background color with 1/16" thick acrylic before being laminated to a minimum of 1/8" thick black opaque acrylic base plate. Provide radius corners. All lettering and colors shall meet ADA requirements. Lettering style shall be 5/8" high Standard Bold Condensed.

   1. Sign Locations:
      a. Approximately 100 signs.

   2. Each sign shall also have the same message in Grade 2 Braille to ADA & TAS standards.

C. Mountings:

   1. Fasteners: Provide appropriate fastening system to secure each sign at the required location as designated by ADA & TAS.

   2. Mounting Location and Height: Signs shall be installed on the wall adjacent
to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60" above the finish floor to the centerline of the sign. Mounting location for such signage shall be so that a person may approach within 3" of signage without encountering protruding object or standing within the swing of a door. Installation shall meet ADA & TAS standards.

D. See Section 01 21 00 Allowances for interior signage allowance for project.

**PART 3 - EXECUTION**

3.1 Inspection of Surfaces:

A. Examine locations and condition of surfaces on which signage will be installed and verify that there are no defects or errors that would prevent the proper execution of this work or endanger its permanency.

3.2 Installation:

A. Install signage plumb and true. Provide anchorage for fastening signs securely in place. Anchorage shall include slotted inserts, expansion shields, and powder-driven fasteners for concrete; toggle bolts and thru-bolts for masonry; machine and carriage bolts for steel; thru-bolts, lag bolts, and screws for wood. Provide slotted inserts of types required to engage with the anchors.

3.3 Dissimilar Materials:

A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorbent materials subject to wetting, coat the surfaces with bituminous paint, asphalt varnish, or metal primer.

3.4 Protection:

A. Protect installed work from damage.

3.5 Cleaning:

A. Repair damage to signs incurred during installation. Replace signs that cannot be repaired to new condition.

**END OF SECTION 10 14 00**
SECTION 10 21 23
CUBICLE CURTAINS, TRACK AND IV TRACKs

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. Curtain tracks and carriers.
   2. Cubicle curtains.
   3. Cubicle Shower curtains.
   4. Overhead metal IV tracks and accessories.

B. Related Requirements:
   1. Section 06 10 53 "Miscellaneous Rough Carpentry" for supplementary wood framing and blocking for mounting items requiring anchorage.
   2. Section 09 22 16 "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.
   3. Section 09 50 00 "Acoustical Ceilings" for metal framing and required anchorage to suspended ceiling suspension systems.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include durability, laundry temperature limits, fade resistance, applied curtain treatment, and fire-test-response characteristics for each type of curtain fabric indicated.
   2. Include data for each type of track.

B. Shop Drawings:
   1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
   2. Include details on blocking above ceiling.
C. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Curtain Fabric: 10-inch square swatch or larger as required to show complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
2. Mesh Top: Not less than 10 inches square.
3. Curtain Track: Not less than 10 inches long.
5. IV Track: Not less than 8 inches long.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Items penetrating finishing ceiling, including the following:
   a. Light fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.

B. Manufacturer's Installation Instructions: For curtain track and hardware to include in operation and maintenance manuals.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For curtains, track, and hardware to include in operation and maintenance manuals.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of light fixtures, walls, columns, ceilings, and other construction contiguous with and adjacent to cubicle and IV tracks by field measurements before fabrication. Verify that field measurements are as indicated on shop drawings.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that cubicle and IV tracks can be supported and installed as scheduled.
1.7 MAINTENANCE MATERIAL SUBMITTALS

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. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of amount installed, but no fewer than 3 units.
2. Curtains: Full-size units equal to 10 percent of amount installed, but no fewer than 6 units.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Track: Support vertical test of 50 psf live load applied at any point along track without visible deflection or damage to tracks, ceilings, and supports.

B. Track Size and Layout: Safely support moving loads. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for cubicle curtain and IV carrier operation and storage.

C. Track and Mounting: Sufficiently rigid to resist visible deflection and without permanent set.

D. Curtains: Provide curtain fabrics with the following characteristics:

   1. Launderable to a temperature of not less than 160 deg F.
   2. Flame resistant and identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.

      a. Identify fabrics with appropriate markings of a qualified testing agency.

2.2 CURTAIN SUPPORT SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide C/S General Cubicle, Surface Mounted Cubicle Track, 1062N Carriers or comparable products by the following:

   1. C/S General Cubicle.
   2. Imperial Fastener Company, Inc.
   3. InPro Corporation

B. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high; with 0.058-inch minimum wall thickness.

   2. Finish: Satin anodized or Baked Enamel, acrylic, epoxy.
C. Curtain Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.

D. Curtain Carriers: Two nylon rollers and nylon axle with aluminum hook.

E. Countersunk Fasteners: Stainless steel.

2.3 CURTAINS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Cubicle Curtain Fabric: (CC-1) Curtain manufacturer's standard, 100 percent polyester; inherently and permanently flame resistant (Designer Cloth with mesh upper panels), stain resistant, and antimicrobial.

1. Subject to compliance with requirements, provide the following:
   a. Standard Textile
   b. Pattern: Stranded
   c. Color: To be selected by Architect from full line of colors in pattern.

C. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.

D. Mesh Top: Not less than 20-inch high mesh top of No. 50 nylon mesh.

E. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.

F. Cubicle Shower Curtain Material: (SWC-1)

1. Subject to compliance with requirements, provide the following:
   a. Manufacturer: C/S General Cubicle
   b. Fabric: Sure-Chek Vinyl
   c. Width: Equal to track length from which curtain is hung plus 10 percent, but not less than 12 inches.
   d. Length: Equal to floor-to-soffit height height minus 2 inches from soffit at top and 12 inches above finish grade.
   e. Top Hem: Not-less-than 1 inch and not more than 1 – 1/2 inch wide, triple thickness, reinforced with integral web and double stitched.
   f. Grommets: 2 piece, rolled-edge, rustproof, nickel-plated brass and spaced not more than 6 inches o.c.
   g. Bottom and Side Hems: Not less than 1 inch wide, reinforced, triple thickness and single stitched.
   h. Curtain Tieback: At each termination.

2.4 CURTAIN FABRICATION

A. Fabricate curtains as follows:
1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor as follows:
   a. Cubicle Curtains: 12 inches.
3. Top Hem: Not less than 1 inch and not more than 1-1/2 inch wide, triple thickness, reinforced with integral web, and double stitched.
4. Mesh Top: Top hem of mesh not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lockstitched. Double lockstitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.
5. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, double thickness and double stitched.
6. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lockstitched.

B. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched.

2.5 IV TRACKS

A. IV Track: Extruded of 6063-T5 aluminum alloy, 1 – 9/16 inches by 15/16 inch with a 0.075 inch minimum wall thickness, by maximum practical length. Drill ends to receive splices and end caps.
   1. Curved Track: Factory-fabricated, 12 inch radius bends.
   2. Finish: Manufacturer’s standard white baked enamel finish.

B. Track End Stop, Tees, Y’s, and Switches: To fit track section. Aluminum finished to match track, easily removable for insertion of carriers, with fasteners for securing in place.

C. IV Carriers: Four nylon rollers and steel or stainless-steel axles, with ball bearings, with hanger loop fabricated from ¼ inch diameter stainless steel.
   1. Provide one I.V. bottle holder and one heavy-duty four wheel I.V. carrier per track.

D. Mounting Hardware: Stainless steel, type and size as required to suit material to which track and accessories are attached.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

A. General: Install tracks level and plumb, according to manufacturer's written instructions.

B. Up to 16 feet in length, provide track fabricated from single, continuous length.
   1. Curtain Track Mounting: Surface.
   2. IV Track Mounting: Surface.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer, but at intervals of not less than 24 inches. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
   1. Mechanically fasten to suspended ceiling grid with countersunk screws.

D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

E. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.

F. Curtains: Hang curtains on each curtain track.

G. IV Hangers: Unless otherwise indicated, install one IV hook on each IV track and hang one IV hanger.

END OF SECTION 10 21 23
SECTION 10 26 00
WALL AND DOOR PROTECTION

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. Corner guards.
   2. Wall guards.

B. Related Sections:
   1. Section 087100 "Door Hardware" for metal armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.

B. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below. Include Samples of material to verify color selected.
   1. Corner Guards: 12 inches long. Include examples of end caps.
   2. Wall Guards: 12 inch long. Include examples of end caps.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Five (5) percent of each type, color, and texture of units installed, but no fewer than four, 8-foot long units.

2. Corner-Guard Covers: Full-size plastic covers of maximum length equal to five (5) percent of each type, color, and texture of units installed, but no fewer than four, 8-foot long units.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Section 014000 "Quality Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.

2. Keep plastic sheet material out of direct sunlight.

3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
a. Store corner-guard covers in a vertical position.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures.
   b. Deterioration of plastic and other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded and sheet material, thickness as indicated.

   1. Impact Resistance: Minimum 30.2 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
   2. Chemical and Stain Resistance: Tested according to ASTM D 543.
   3. Self-extinguishing when tested according to ASTM D 635.
   4. Flame-Spread Index: 25 or less.
   5. Smoke-Developed Index: 450 or less.

B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.

C. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 for Alloy 6063-T5.

D. Stainless-Steel Sheet: ASTM A 240/A 240M.

F. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.2 CORNER GUARDS

A. Surface-Mounted, Resilient, Plastic Corner Guards: Manufacturer’s standard, assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. InPro Corporation, Style 160BN.

2. Cover: Extruded rigid plastic, minimum 0.080-inch wall thickness; in dimensions and profiles indicated on Drawings.
   a. Profile: Nominal 2-inch long legs and 1/4 inch corner radius.
   b. Height: See drawings.
   c. Color and Texture: As selected by Architect from manufacturer’s full range.

3. Continuous Retainer: Minimum 0.070-inch thick, one-piece, extruded aluminum.

4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.3 END-WALL GUARDS

A. Surface-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover installed over continuous retainer with end of wall covered by semirigid, impact-resistant sheet wall covering; including mounting hardware.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. InPro Corporation, Style 160D.

2. Cover: Extruded rigid plastic, minimum 0.080-inch wall thickness; in dimensions and profiles indicated on Drawings.
   a. Profile: Nominal 2-inch long legs and ¼ inch corner radius.
   b. Height: 4 feet high.
   c. Color and Texture: As selected by Architect from manufacturer’s full range.

3. Continuous Retainer: Minimum 0.070-inch thick, one-piece, extruded aluminum.

4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
2.4 WALL GUARDS

A. Surface-Mounted, Resilient, Plastic Wall Guard: Assembly consisting of snap-on plastic cover installed over continuous retainer with end of wall covered by semi-rigid, impact-resistant cap; including mounting hardware.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. InPro Corporation, Style 1600.
2. Cover: Extruded rigid plastic, minimum 0.080-inch wall thickness; in dimensions and profiles indicated on Drawings.
   a. Height: 6 inch.
   b. Color and Texture: As selected by Architect from manufacturer’s full range.
3. Continuous Retainer: Minimum 0.080-inch thick, one-piece, extruded aluminum.
4. End Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.5 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Quality: Fabricate components with uniformly 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 substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances] and other conditions affecting performance of work.

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION
A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
   1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings or, if not indicated, at heights indicated below:
   2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
      a. Provide anchoring devices to withstand imposed loads.
      b. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches.
      c. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING
Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
A. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

3.5 SCHEDULE OF FINISHES
A. Wall Guards: (WG-1)
   1. Manufacturer: Inpro
   2. Series: 1600 Wall Guard
   3. Color: Oatmeal 0239

B. Corner Guards: (CG-1)
   1. Manufacturer: Inpro
   2. Series: 160BN Corner Guard
   3. Color: Oatmeal 0239

C. End Wall Protection: (EW-1)
   1. Manufacturer: Inpro
   2. Series: 160DBN End Wall Protection
   3. Color: Oatmeal 0239
END OF SECTION 10 26 00
SECTION 10 26 01
RIGID WALL VINYL

PART 1 - GENERAL

1.1 SUMMARY
A. Rigid vinyl sheet for wall protection and decoration

1.2 SECTION INCLUDES
A. IPC Rigid Vinyl Sheet

1.3 REFERENCES
A. American Society for Testing and Materials (ASTM)
B. National Building Code of Canada (NBC)
C. National Fire Protection Association (NFPA)
D. Society of Automotive Engineers (SAE)
E. Underwriters Laboratory (UL)
F. Underwriters Laboratory of Canada (ULC)
G. Uniform Building Code (UBC)

1.4 SYSTEM DESCRIPTION
A. Performance Requirements: Provide rigid vinyl sheet systems that conform to the following requirements of regulatory agencies and the quality control of IPC Door and Wall Protection Systems™, InPro Corporation.

1. Fire Performance Characteristics: Provide UL Classified IPC Rigid Vinyl Sheet conforming with the NFPA Class A fire rating. Surface burning characteristics as determined by UL-723 (ASTM E-84), for IPC Rigid Vinyl Sheet installed with 3M Fastbond 30, InPro Bond Adhesive, or Formulated Solutions, LLC "XT-2000+" Adhesive shall be a maximum flame spread of 20 and a maximum smoke developed of 350 for .060" (1.5mm) thick material. Provide ULC (Canada) listed IPC Rigid Vinyl Sheet conforming to the requirements of the National Building Code of Canada 2010, Subsection 3.1.13. Surface burning characteristics, as determined by CAN/ULC-S102.2, shall be flame spread of 15 and smoke developed of 30.

2. Self Extinguishing: Provide rigid vinyl sheet with a CC1 classification, as tested in accordance with the procedures specified in ASTM D-635-74, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position, as referenced in UBC 52-4-1988.
3. Provide sheet materials that have been tested and results filed in compliance with article 15, part 1120 of the New York State uniform fire prevention and building code. DOS # 09960-930.504.4001.

4. Impact Strength: Provide IPC Rigid Vinyl Sheet that has an Impact Strength of 30.4 ft-lbs/ inch of thickness as tested in accordance with the procedures specified in ASTM D-256-90b, Impact Resistance of Plastics.

5. Chemical and Stain Resistance: Provide rigid vinyl sheet that show resistance to stain when tested in accordance with applicable provisions of ASTM D-543.


7. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G-21 and ASTM G-22.

8. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

1.5 SUBMITTALS

A. Product Data: Manufacturer's printed product data for each type of IPC Rigid Vinyl Sheet specified.

B. Detail Drawings: Mounting details with the appropriate adhesives for specific project substrates.

C. Samples: Verification samples of IPC Rigid Vinyl Sheet, 8” (203mm) square, of each type and color indicated.

D. Manufacturer's Installation Instruction: Printed installation instructions for IPC Rigid Vinyl Sheet.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite

B. Inspect materials at delivery to assure that specified products have been received.

C. Store in original packaging in a climate controlled location away from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Products must be installed in an interior climate controlled environment.

1.8 WARRANTY

A. Standard IPC Limited Lifetime Warranty against material and manufacturing defects.
PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer:
   IPC Door and Wall Protection Systems, InPro Corporation, PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407, www.inprocorp.com

B. Substitutions: Not permitted

C. Provide all IPC Rigid Vinyl Sheet and wall protection from a single source.

2.2 MANUFACTURED UNITS

A. Rigid Vinyl Sheet

   1. IPC Rigid Vinyl Sheet – Palladium Solid Color
      Item # Dimensions Thickness
      405 4’x10’ (1.22m x 2.44m) .040” = 3/64” (1mm), standard
         Backing - unbacked

B. Inside Corners

   1. 409 Inside Corner; Length: 8’ (2.44m) standard, 10’ (3.04m) available

C. Outside Corners

   1. 3448, 3496, 11248 or 11296 Outside Corner

D. Color Matched Caulk – All butt joints

   1. 580 Color matched VinylSeal

2.3 MATERIALS

A. Vinyl: IPC shall be manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).

2.4 ACCESSORIES

A. Top caps, inside corners, divider bars and outside corners shall be made of extruded PVC.

2.5 FINISHES

A. Color(s) or pattern of IPC Sheet to be selected by the architect from the IPC Sheet finish selection. Surface shall have a velvet texture.
B. Vinyl Accessories: Top caps, inside corners, divider bars and outside corners shall be of a color matching the IPC.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine areas and conditions in which the rigid vinyl sheet will be installed.
   1. Complete all finishing operations, including painting, before beginning installation of rigid vinyl sheet materials.

B. Wall surface shall be dry and free from dirt, grease and loose paint.

3.2 PREPARATION
A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.3 INSTALLATION
A. General: Locate the rigid vinyl sheet as indicated on the approved detail drawing for the appropriate substrate and in compliance with the IPC installation instructions. Install level and plumb at the height indicated on the drawings.

B. Installation of IPC Rigid Vinyl Sheet
   1. Adhere to substrate with InPro Bond, a freeze-thaw stable, nonflammable, high strength, water based adhesive that trowels on and allows approximately 20 minutes working time before firming.
   2. Adhere to substrate with XT-2000+, a freeze-thaw stable, nonflammable, high strength, water based adhesive that trowels on and allows approximately 20 minutes working time before firming.
   3. Adhere to substrate with Fastbond 30, a nonflammable, high strength, water-dispersed contact adhesive, with very little odor. Smooth roll surface.
   4. At all butt joints provide color coordinated caulking. See manufacturer’s recommended procedure for butt joint installation.

3.4 CLEANING
A. At completion of the installation, clean surfaces in accordance with the IPC clean-up and maintenance instructions.

END OF SECTION 10 26 01
SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES

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. Public-use washroom accessories.
   5. Infant care products
   6. Anti-ligature products.

B. Owner-Furnished Material:

C. Related Sections:
   1. Section 088300 "Mirrors" for frameless mirrors.
   2. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 ACTION 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.
   2. Identify products using designations indicated.
1.4  CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5  QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.6  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.

PART 2 - PRODUCTS

2.1  MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.


F. 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.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
4. Hafele
5. Weizel Security Products

B. Toilet Tissue (Roll) Dispenser:

2. Description: Double-roll dispenser.
5. Capacity: Designed for 4-1/2- or 5-inch diameter tissue rolls.

C. Paper Towel (Folded) Dispenser:

3. Minimum Capacity: 350 C-fold or 475 multifold towels.
5. Lockset: Tumbler type.

D. Combination Towel (Folded) Dispenser/Waste Receptacle:

2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
   a. Designed for nominal 4-inch wall depth.
4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

E. Liquid-Soap Dispenser:

2. Description: Designed for dispensing soap in liquid form.
7. Refill Indicator: Window type.

F. Grab Bar:
   3. Material: Stainless steel, 0.048 inch thick.
      a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
   5. Configuration and Length: As indicated on Drawings.

G. Recess Dual Sanitary Napkin/Tampon Dispenser:
   2. Type: Sanitary napkin and tampon dispenser.
   3. Mounting: Recess for 4” wall depth.
   5. Operation: Two coin, 50 cents.
   6. Lockset: Tumbler type with separate lock and key for coin box.

H. Sanitary Napkin Disposal Unit:
   1. Basis-of-Design Product: Bobrick Model B-4353
   3. Door and Cover: Self-closing, disposal-opening cover with tumbler lockset
   4. Receptacle: Removable
   5. Material: Stainless steel, No. 4 finish (satin).

I. Sanitary Napkin Disposal, Recessed in Wall:
   1. Basis-of-Design Product: Bobrick Model B-35303
   2. Material: Stainless Steel
   4. Door: Push type, self-closing
   5. Mounting: Recessed in wall
   6. Receptacle: Leak proof, plastic, removable; capacity 1.2 gallons

J. Mirror Unit:
   1. Basis-of-Design Product: Bobrick Model B-165
   2. Frame: Channel frame fabricated of 18-8 stainless steel, type 304, 20 gauge.
      a. Corners: Manufacturers mitered and ground smooth.
   3. Hangers: Produce rigid, tamper and theft-resistant installation, using method indicated below:
      a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

K. Anti-ligature Paper Towel Dispenser, Surface:
2. Material: Stainless Steel, 22 gage
3. Construction: All-welded
4. Mounting: Surface
5. Capacity: 400 C-fold or 525 multi-fold paper towels.

L. Recess Anti-ligature Toilet Tissue Dispenser:
   1. Basis-of-Design: Bradley SA12
   2. Flange: 14 gage stainless steel with exposed surfaces, satin finish
   3. Holder: 16 gage stainless steel with exposed surfaces, satin finish
   4. Capacity: One standard roll of toilet tissue up to 5-3/8 inch diameter
   5. Mounting: Recessed

M. Recess Anti-ligature Soap Dispenser:
   1. Basis-of-Design: Bobrick B-4063
   2. Cabinet / Flange: Heavy gage stainless steel, satin finish
   3. Faceplate: 20-gage stainless steel with satin finish
   4. Capacity: 50 fluid ounces
   5. Mounting: Recessed

N. Ligature Resistant Grab Bars:
   1. Basis-of-Design: Bradley SA70
   2. Size: Refer to Drawings
   3. Material:
      a. Tubing: Stainless steel, 18 gage, type 304, satin finish
      b. Closure Plate: 11 gauge stainless steel
   4. Construction: 1-1/2 inch clearance between grab bar and wall
   5. Mounting: Concealed plates with no exposed fasteners

O. Anti-ligature Robe Hook:
   1. Basis-of-Design: Hafele 844.76.050
   2. Material: Stainless Steel or Aluminum, satin finish
   3. Construction: Adjustable spring weight
   4. Mounting: Surface with no exposed fasteners

P. Anti-ligature Stainless Steel Mirror
   1. Basis-of-Design: Bradley 748
   2. Material
         1) Quarter inch return to conceal backing.
      b. Backing: Tempered Masonite bonded to mirror with adhesive
   3. Size: 18 inches wide by 36 inches high
   4. Mounting: Concealed hangers

Q. Double Robe Hook
   1. Basis-of-Design: Bobrick B-6727
   2. Material: Stainless steel, 18 gage, type 304, satin finish
   3. Construction: Double-hook, concealed wall plate, no exposed fasteners
   4. Mounting: Surface

R. Baby Changing Unit
1. **Basis-of-Design**: Bobrick (Koala Kare) KB110-SSRE
2. **Material**: Durable, high-impact polyethylene with foam core bed with stainless steel face
3. **Construction**: Bed secured to back plate with a concealed, full-length stainless steel hinge rod with steel bushings embedded in the plastic; equipped with pneumatic cylinder; smooth concave changing area.
4. **Accessories**: Nylon safety strap, two hooks for bags and purses, universal instruction graphics
5. **Mounting**: Recessed.

**S. Surface Mounted Shelf:**
1. **Basis-of-Design**: Bobrick B-295
2. **Material**: 18 gag stainless steel with exposed surfaces satin finish
3. **Construction**: All corners heliarc welded and ground smooth
4. **Size**: 5 inches wide. Refer to drawings for lengths.

### 2.3 HEALTHCARE ACCESSORIES

**A. Basis-of-Design Product**: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. **American Specialties, Inc.**
2. **Bobrick Washroom Equipment, Inc.**
3. **Bradley Corporation.**

**B. Specimen Pass-Through Cabinet:**

1. **Basis-of-Design Product**: Bobrick B-505.
2. **Description**: With minimum 12-inch square specimen cabinet from patient to staff.
3. **Nominal Wall Opening**: 11-1/4” by 10-9/16 inches, width times height.
4. **Material and Finish**: Stainless steel, No.4 finish (satin).
5. **Construction**: One piece seamless flanges. Self-closing doors secured to cabinet with full-length stainless steel piano hinge and locking mechanism to prevent both doors from opening at once. Removable tray provided.

### 2.4 UNDERLAVATORY GUARDS

**A. Underlavatory Guard:**

1. **Basis-of-Design Product**: Truebro Lavguard2 Model 103 EZ.
2. **Description**: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
3. **Material and Finish**: Antimicrobial, molded plastic, white.

### 2.5 CUSTODIAL ACCESSORIES

**A. Mop and Broom Holder:**
2. Description: Unit with holders.
3. Length: 36 inches.
4. Hooks: None.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.

B. Paper Towel (Folded) Dispenser:

3. Minimum Capacity: 400 C-fold or 525 multifold towels.
5. Lockset: Tumbler type.
6. Refill Indicators: Pierced slots at sides or front.

2.6 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00
SECTION 10 44 13
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

   a. Portable fire extinguishers.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semi-recessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches square.

D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semi-recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING
A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET
A. Cabinet Type: Suitable for fire extinguisher.
   1. **Basis-of-Design Product:** Subject to compliance with requirements, provide Larsen’s Architectural Series, A2409-6R. For fire extinguisher cabinets in rated walls, refer to drawings for locations. Provide Larsen’s Manufacturing Company, Architectural Series FS A2409-6R.
B. Cabinet Material: Aluminum sheet.
C. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
D. Cabinet Trim Material: Extruded-aluminum shapes.
E. Door Material: Steel Sheet.
F. Door Style: Solid opaque panel with frame.
G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
H. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
      a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
1) Location: Applied to cabinet glazing.
2) Lettering Color: Black.
3) Orientation: Vertical.

I. Materials:
   1. Cold-Rolled Steel: ASTM A 1008/A 1008/M, Commercial Steel (CS), Type B.
      a. Finish: Baked enamel or powder coat.
      b. Color: White

2.2 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.
   3. Prepare doors and frames to receive locks.
   4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
   2. Fabricate door frames of one-piece construction with edges flanged.
   3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.3 GENERAL FINISH REQUIREMENTS


B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION
A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
   1. Fire-Protection Cabinets: 48 inches above finished floor to centerline of cabinet handle.
B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semi-recessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING
A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures
recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13
SECTION 10 44 16

FIRE EXTINGUISHERS

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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:
   1. Section 104413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.
1.7  WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure of hydrostatic test according to NFPA 10.
   b. Faulty operation of valves or release levers.

2. Warranty Period: Six (6) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire extinguisher and mounting bracket indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MP5 fire extinguisher and B2 mounting bracket or comparable product by one of the following:
   a. Larsen's Manufacturing Company.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated 5 lbs. nominal capacity, with mono-ammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure in mechanical rooms, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and inspection tagging.
   1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
   1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16
SECTION 10 51 13
METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Box lockers.

1.2 ACTION SUBMITTALS

A. Prepare submittals per requirements of Section 01 33 00 – Submittal Procedures.

B. Product Data: Each type of metal locker.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.

C. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Show locker trim and accessories.
   3. Include locker identification system and numbering sequence.

D. Samples: For each color specified, in manufacturer's standard size.

E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

F. Samples for Verification: For the following products, in manufacturer's standard size:
   1. Lockers and equipment.

G. Product Schedule: For lockers.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

B. Manufacturer warranties.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with applicable requirements.
B. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for installation.

1.5 FIELD CONDITIONS

A. Field Measurements: Measure in-place construction as needed for fabrication and execution of the Work. No changes to Contract Sum or Contract Time will be allowed for differences between Drawing dimensions and field measurements.

1.6 COORDINATION

A. Coordinate sizes and locations of bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.7 MANUFACTURER WARRANTIES

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures.
   b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.

3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Penco Vanguard Lockers

B. Source Limitations: Obtain metal lockers, locker benches, and accessories from single source from single locker manufacturer.

C. Substitutions: See Section 01 33 00 for substitution process.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements: For lockers indicated to be accessible, and all benches, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1. Comply also with applicable provisions of Texas Accessibility Standards.

2.3 KNOCKED-DOWN METAL LOCKERS
A. Locker Schedule:

1. Box lockers.
   a. Size: 12-inch wide by 12-inches deep.
   b. Configuration: 4-tier, 72-inches total height.

B. Doors: One piece; fabricated from 0.060-inch (1.52-mm) 16 gauge nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.048-inch, 18 gauge (1.21-mm) nominal-thickness steel sheet.
2. Doors for box lockers less than 15 inches (381 mm) wide may be fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet; welded to inner face of doors.
5. Door Style:
   a. Louvered Vents: Provide louvered doors in manufacturer’s standard louver pattern.

C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch (0.61-mm), 24 gauge nominal thickness, with single bend at sides.
2. Backs and Sides: 0.024-inch (0.61-mm), 24 gauge nominal thickness, with full-height, double-flanged connections.
3. Shelves: 0.024-inch (0.61-mm), 24 gauge nominal thickness, with double bend at front and single bend at sides and back.

D. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm), 16 gauge nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Knuckle Hinges: Steel, full loop, five knuckle, tight pin; minimum 2 inches (51 mm) high. Provide minimum three hinges for each door more than 42 inches (1067 mm) high.
2. Continuous Hinges: Manufacturer's standard, steel, full height.
3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
F. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift control designed to use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
   a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer’s standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

G. Padlocks will be provided by Owner.

H. Identification Plates: Manufacturer’s standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch (9 mm) high.

I. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.

J. Continuous Zee Base: Fabricated from 0.075-inch, 14 gauge nominal-thickness steel sheet.

   1. Height: 4 inches.

K. Continuous Sloping Tops: Fabricated from 0.048-inch (1.21-mm), 18 gauge manufacturer's standard thickness steel sheet.

   2. Sloping-top corner fillers, mitered.

L. Recess Trim: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

M. Filler Panels: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

N. Boxed End Panels: Fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet.

O. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet.

P. Materials:
   1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
Q. Finish: Baked enamel or powder coat.
   1. Color: As selected by Architect from manufacturer's full range.

2.4 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
   1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
   2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate and the following equipment:
   1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
   2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
   3. Triple-Tier Units: One double-prong ceiling hook.

D. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project site.

E. Accessible Lockers: Fabricate as follows:
   1. Locate bottom shelf no lower than 15 inches (381 mm) above the floor.
   2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches (1219 mm) above the floor.

F. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
   1. Sloping-top corner fillers, mitered.

H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
I. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of non-recessed metal lockers; finished to match lockers.
   1. Provide one-piece panels for double-row (back-to-back) locker ends.

J. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.
   1. Provide one-piece panels for double-row (back-to-back) locker ends.

K. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

L. Attach door locks on doors using security-type fasteners.

2.5 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts at all walls for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION

A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
   1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o/c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
   2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
   3. Anchor back-to-back metal lockers to floor.
B. Knocked-Down Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Identification Plates: Identify metal lockers with identification indicated on Drawings.
   1. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   2. Attach plates to upper shelf of each open-front metal locker, centered, with at least two aluminum rivets.

D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
   1. Attach recess trim to recessed metal lockers with concealed clips.
   2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
   3. Attach sloping-top units to metal lockers, with closures at exposed ends.
   4. Attach boxed end panels using concealed fasteners to conceal exposed ends of non-recessed metal lockers.
   5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.

3.3 ADJUSTING
   A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding and fore secure closure.

3.4 PROTECTION
   A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
   B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13
SECTION 10 82 00
LOUVERED HURRICANE EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fixed, extruded-aluminum louvered roof top equipment screens

B. See Division 5 Section "Structural Metal Framing" for structural framing supporting louver sections.

1.2 PERFORMANCE REQUIREMENTS

A. Design: Design louvers, including comprehensive engineering analysis by a qualified professional 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 as required for the project acting inward or outward. See Section 01 45 00 Windstorm Construction Requirements and Structural drawings for wind speed and pressure requirements.

   C. Miami-Dade protocols: Louver design shall pass the following tests.
      1. PA 201-94 Large Missile Impact.
      2. PA 202-94 Uniform Pressure (for ±150 psf wind load).
      3. PA 203-94 Cyclic Wind Pressure.

1.3 SUBMITTALS

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

B. Shop Drawings: For equipment screens 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: Comply with structural performance requirements and design criteria indicated. Note structural design load on drawings.

E. Miami-Dade County Building Code Compliance Office (BCCO) – Check published list for approval of Hurricane Louvers.

F. Submittal shall include project specific calculations and be sealed by a licensed engineer authorized to accomplish work in state of Texas. See Section 01 45 00 for additional submittal requirements.

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, 300 series stainless-steel fasteners.

2.2 FABRICATION, GENERAL

A. Join concealed frame members to each other and to fixed louver blades with threaded fasteners unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 EXTRUDED-ALUMINUM ROOF TOP EQUIPMENT SCREEN

A. Horizontal Blade Hurricane Rated Louvered Equipment Screen
   1. Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model V6JF. 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 01 25 00 - Product Substitution Procedures.
   2. Louver Blade Depth: 4 inches (100 mm)
   3. Louver Frame Depth: 6 inches (150 mm)
   4. Blade Profile: Plain blade without center baffle.
   5. Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
   6. Framing Support Nominal Thickness: Not less than 0.125 inch (3.2 mm)
   7. Louver Performance Requirements:
      a. Free Area: Not less than 8.7 sq. ft. (0.81 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver assembly.

b. Structural: Approvals for up to 150 lbs. per sq. ft. wind loading

8. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 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 equipment screens 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 clearances and attachments to allow for thermal expansion, 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.

END OF SECTION 10 82 00
SECTION 12 36 23.13

PLASTIC-LAMINATE-CLAD COUNTERTOPS

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 plastic-laminate countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

   1. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in plastic-laminate countertops.
   2. Apply AWI Certified Compliance Program label to Shop Drawings.
   3. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection:

   1. Plastic laminates.

D. Samples for Verification:

   1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
   2. Wood-grain plastic laminates, 12 by 24 inches for each type, pattern and surface finish.
1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product.
B. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
B. Installer Qualifications: Fabricator of products.
C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
B. Field Measurements: Where countertops are 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.
C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels from certification program indicating that countertops, including installation, comply with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Wilsonart Americas – Premium Aeon

D. Chemical-Resistant, High-Pressure Decorative Laminate where noted in plans: NEMA LD 3, Grade HGP, and as follows:

1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.9.5:

   a. Nitric Acid (30 Percent): Moderate effect.
   b. Sulfuric Acid (77 Percent): Moderate effect.
   c. Hydrochloric Acid (37 Percent): Moderate effect.
   d. Phosphoric Acid (75 Percent): No effect.
   e. Acetic Acid (98 Percent): No effect.
   f. Formaldehyde: No effect.
   g. Ethyl Acetate: No effect.
   h. Ethyl Ether: No effect.
   i. Phenol (85 Percent): Moderate effect.
   j. Benzene: No effect.
   k. Xylene: No effect.
   l. Butyl Alcohol: No effect.
   m. Furfural: No effect.
   n. Methyl Ethyl Ketone: No effect.
   o. Sodium Hydroxide (25 Percent): No effect.
   p. Sodium Sulfide (15 Percent): No effect.
   q. Ammonium Hydroxide (28 Percent): No effect.
   r. Zinc Chloride: No effect.
   s. Gentian Violet: No effect.
   t. Methyl Red: No effect.
E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by manufacturer’s designations.
2. Color selection and finish shall be from manufacturer’s Premium AEON enhanced performance process line of products:
   a. Solid colors, finish as selected by Architect.
   b. Solid colors with core same color as surface, finish as selected by Architect.
   c. Wood grains, HD finish.
   d. Patterns, finish as selected by Architect.

3. Grain Direction: To be noted by Architect in shop drawings.

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

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

H. Core Material at Sinks: Particleboard made with exterior glue.

I. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

J. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.


2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

3. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are 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 to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
4. 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.

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 index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.
2.4 ACCESSORIES

A. Grommets for Cable Passage through Countertops: 3-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

B. Paper Slots: 12 inches long by 1-3/4 inches wide by 1 inch deep; black, molded-plastic, paper-slot liner with 1/4-inch lip.

2.5 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
   1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

C. Complete fabrication, including assembly, 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 before disassembling for shipment.

D. Shop cut openings to maximum extent possible to receive 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.
PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
   1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
   2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
   1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer’s written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   2. Secure backsplashes to walls with adhesive.
   3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 12 36 23.13
SECTION 12 36 23.19
SOLID SURFACE COUNTERTOPS/ FABRICATIONS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following horizontal and trim solid surface product types:

1. Countertops
2. Reception areas/exam rooms
3. Windowsills
4. See plans for other locations

B. Related Sections include the following:
   1. Division 5 Section “Metal Fabrications” for Blocking.
   2. Division 6 Section “Rough Carpentry” for Blocking.

1.3 DEFINITION

A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 SUBMITTALS

A. Product data:
   1. For each type of product indicated.
   2. Product data for the following.

B. Shop drawings:
   1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
      a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
      b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
      c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

SOLID SURFACE COUNTERTOPS/ FABRICATIONS
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C. Samples:
   1. For each type of product indicated.
      a. Submit minimum 6-inch by 6-inch sample in specified gloss.
      b. Cut sample and seam together for representation of inconspicuous seam.
   2. Approved samples will be retained as a standard for work.

D. Product data:
   1. Indicate product description, fabrication information and compliance with specified performance requirements.

E. Product certificates:
   1. For each type of product, signed by product manufacturer.

F. Manufacturer certificates:
   1. Signed by manufacturers certifying that they comply with requirements.

G. Maintenance data:
   1. Submit manufacturer’s care and maintenance data, including repair and cleaning instructions.
      a. Maintenance kit for finishes shall be submitted.
   2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:
   1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:
   1. Standards of the following, as referenced herein:
      a. American National Standards Institute (ANSI)
      b. American Society for Testing and Materials (ASTM)
      c. National Electrical Manufacturers Association (NEMA)
      d. NSF International
   2. Fire test response characteristics:
      a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
         1) Flame Spread Index: 25 or less.
         2) Smoke Developed Index: 450 or less.

D. Coordination drawings:
   1. Shall be prepared indicating:

SOLID SURFACE COUNTERTOPS/ FABRICATIONS
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a. Plumbing work.
b. Electrical work.
c. Miscellaneous steel for the general work.
d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.

2. Content:
   a. Project-specific information, drawn accurately to scale.
   b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
   c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
   d. Provide alternate sketches to designer for resolution of such conflicts.
      1) Minor dimension changes and difficult installations will not be considered changes to the contract.

E. Drawings shall:
   1. Be produced in 1/2-inch scale for all fabricated items.

F. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
   1. No review or approval will be forthcoming.
   2. Coordination drawings are required for the benefit of contractor’s fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

G. Job mock-up:
   1. Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.
   2. Mock-up shall be of typical exam room countertop.
   3. Build the mock-up to comply with the contract documents and install in a location as directed by the Architect.
   4. Notify the architect two weeks in advance of the date of when the mock-up will be delivered.
   5. Should mock-up not be approved, re-fabricate and reinstall until approval is secured.
      a. Remove rejected units from project site.
   6. After approval, the mock-up may become a part of the project.
   7. This mock-up, once approved, shall serve as a standard for judging quality of all completed units of work.

H. Pre-installation conference:
   1. Conduct conference at project site to comply with requirements in Division 1.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver no components to project site until areas are ready for installation.
B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.
   1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

A. Provide manufacturer’s warranty against defects in materials.
   1. Warranty shall provide material and labor to repair or replace defective materials.
   2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

B. Optional Installed Warranty:
   1. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a DuPont Certified Fabrication/Installation source who will provide a brand plate for the application.
   2. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.

C. Manufacturer’s warranty period:
   1. Ten years from date of substantial completion.

1.8 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Subject to compliance with requirements, provide products by one of the following:
      a. Corian® surfaces from the DuPont company (basis of design).

2.2 MATERIALS

A. Solid polymer components
   1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
   2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

B. Thickness:
1. 1/2 inch.
C. Edge treatment:
  1. Eased

D. Performance characteristics:

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Result</th>
<th>Test</th>
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<tr>
<td>Tensile Strength</td>
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<td>Tensile Modulus</td>
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<td>Boiling Water Resistance</td>
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<td>High Temperature Resistance</td>
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<td>Method 3.6</td>
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<td>Izod Impact</td>
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SOLID SURFACE COUNTERTOPS/ FABRICATIONS

Flame Spread Index  <25
Smoke Developed Index  <25

† Approximate weight per square foot: 1/2" (12.3 mm) 4.4 lbs.
Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.
NEMA results based on the NEMA LD 3-2000

2.3 ACCESSORIES

A. Joint adhesive:
   1. Manufacturer’s standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:
   1. Manufacturer’s standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

C. Conductive tape:
   1. Manufacturer’s standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

D. Insulating felt tape:
   1. Manufacturer’s standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.4 FACTORY FABRICATION

A. Shop assembly
   1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.
   2. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints.
      a. Reinforce with strip of solid polymer material, 2" wide.
   3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
   4. Rout and finish component edges with clean, sharp returns.
      a. Rout cutouts, radii and contours to template.
      b. Smooth edges.
      c. Repair or reject defective and inaccurate work.

B. Thermoforming:
   1. Comply with manufacturer’s data.
   2. Heat entire component.
      a. Material shall be uniform, between 275 and 325 degrees Fahrenheit during forming.
   3. Form pieces to shape prior to seaming and joining.
   4. Cut pieces to finished dimensions.
   5. Sand edges and remove nicks and scratches.

SOLID SURFACE COUNTERTOPS/ FABRICATIONS 12 36 23.19- 6
2.5 FINISHES

A. Solid Surface: (SSB-1)
   1. Manufacturer: Corian
   2. Color: Weathered Concrete
   3. Thickness: 1/2 inch
   4. Location: Waterfall Countertop Edge

B. Solid Surface: (SS-1)
   1. Manufacturer: Corian
   2. Color: Clam Shell
   3. Thickness: 1/2 inch
   4. Location: Countertops

PART 3 — EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

3.2 INSTALLATION

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
   1. Provide product in the largest pieces available.
   2. Form field joints using manufacturer’s recommended adhesive, with joints inconspicuous in finished work.
      a. Exposed joints/seams shall not be allowed.
   3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
   4. Cut and finish component edges with clean, sharp returns.
   5. Rout radii and contours to template.
   6. Anchor securely to base cabinets or other supports.
   7. Align adjacent countertops and form seams to comply with manufacturer’s written recommendations using adhesive in color to match countertop.
   8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
   9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

B. Coved backsplashes and applied sidesplashes:
   1. Install applied sidesplashes using manufacturer’s standard color-matched silicone sealant.
2. Adhere applied sidesplashes to countertops using manufacturer’s standard color-matched silicone sealant.

3.3 REPAIR

A. Repair or replace damaged work which cannot be repaired to architect’s satisfaction.

3.4 CLEANING AND PROTECTION

A. Keep components clean during installation.

B. Remove adhesives, sealants and other stains.

3.5 SCHEDULE

A. See plans for locations of finishes.

END OF SECTION 12 36 23.19
SECTION 12 36 61.19
QUARTZ AGGLOMERATE COUNTERTOPS

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. Quartz countertops.
   2. Quartz backsplashes.
   3. Quartz end splashes.
   4. See plan for locations of quartz.
B. Related Requirements:
   1. Section 224300 "Plumbing Fixtures" for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS
A. Product Data: For countertop materials.
B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.
C. Samples for Initial Selection: For each type of material exposed to view.
D. Samples for Verification: For the following products:
   1. Countertop material, 6 inches square.
   2. Wood trim, 8 inches long.
   3. One full-size quartz countertop, with front edge, 8 by 10 inches, of construction and in configuration specified.
1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

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

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1.  Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Acceptable Manufacturer’s
   a. Wilsonart Quartz
2. Colors and Patterns: As selected by Architect from manufacturer's full range. See finish legend on sheet A611 of Finish plans for selections.

B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

   1. Front: Straight, slightly eased at top.
   2. Backsplash: Straight, slightly eased at corner.

C. Countertops: 1/2-inch- thick, quartz with front edge built up with same material.

D. Backsplashes: 1/2-inch- thick, quartz.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops without joints.

G. Joints: Fabricate countertops in sections for joining in field.

   1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
   2. Joint Type: Bonded, 1/32 inch or less in width.
   3. Joint Type: Grouted, 1/16 inch in width.
   4. Joint Type: Sealant filled, 1/16 inch in width.
   5. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit.

H. Cutouts and Holes:

   1. Undercounter Plumbing Fixtures: Make cutouts for fixtures 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 into fixture opening.
b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.


3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.


2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

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PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

QUARTZ AGGLOMERATE COUNTERTOPS/FABRICATIONS
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C. Fasten sub-tops to cabinets by screwing through sub-tops into corner blocks of base cabinets. Shim as needed to align sub-tops in a level plane.

D. Secure countertops to sub-tops with adhesive according to quartz manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
   1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
   2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
   1. Seal edges of cutouts in particleboard sub-tops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 12 36 61.19