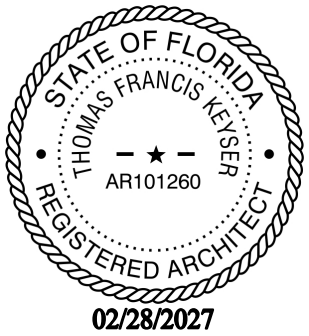
PROJECT MANUAL
BID PACKAGE TWO

VOLUME ONE

FOR



ESCAMBIA COUNTY
AREA TRANSIT FACILITY
100 CLARINDA LANE
PENSACOLA, FLORIDA 32505

BY

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DATE: OCTOBER 22, 2026
PROJECT NO. 2613

VOLUME ONE: Procurement & Contracting Requirements, General Requirements, and Architectural Work

Issue Date: October 22, 2026

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END OF SECTION

SECTION 011000

SUMMARY

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes the following:
   1. Work covered by the Contract Documents.
   2. Type of the Contract.
   3. Phased construction.
   4. Owner-furnished products.
   5. Use of premises.
   6. Owner's occupancy requirements.
   7. Work restrictions.
   8. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Escambia County Area Transit Facility
   1. Project Location: 100 Clarinda Lane, Pensacola, Florida 32505

B. Owner: The Escambia County Board of County Commissioners
   1. Owner's Representative: Jacob's Engineering

C. Architect: Architectural Design Group, Inc., 800 SW Adams Street, Suite 101, Peoria, Illinois 61602.
   1. Architect's Representative: Paul Kouri

D. The Work consists of the following:
   1. The Work includes the design and construction of a new Escambia County Area Transit (ECAT) complex that includes and Administration Building, Transfer Center, Bus Wash,

Fuel Depot, and Maintenance Building.

1.4 PHASED CONSTRUCTION

A. The Work shall be conducted in one phase as described on the Drawings.

1.5 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections.
   1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
   2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
   3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
   4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
   5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
   6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
   7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
   8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
   9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
   10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
   11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

B. Owner-Furnished Products as scheduled on the drawings.

1.6 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

2. Architect will prepare a Certificate of Substantial Completion for the Project.

1.7 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
   1. Weekend Hours: Only during scheduled and approved times.
   2. Early Morning Hours: Only during scheduled and approved times.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's and Owner's written permission.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI (Construction Specifications Institute (United States)) /CSC's (Construction Specifications Canada (Canada)) "MasterFormat" 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; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
   2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

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.

1.9 MISCELLANEOUS PROVISIONS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012100

ALLOWANCES

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

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

B. Types of allowances include the following:
   1. Lump-sum allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

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

1.5 COORDINATION

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

1.6 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials selected by Architect under allowance and shall include freight, labor, installation, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, overhead and profit, and similar costs shall be included as part of the Allowance.

1.7 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.

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.

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: 274100 Audio Video System - Item #2 - Exterior Digital Signage System - Provide an allowance for $150,000 for a Bright Sign Bus Transportation turnkey system. System to consists of numerous monitors for gate locations and schedules on site. System to include TV's /mounts, hardware, programming and installation.

B.

C. END OF SECTION

D.

E.

END OF SECTION

SECTION 012200

UNIT PRICES

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:
1. See Project Contract.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to the Contract Sum by appropriate modification, if the scope of Work required by the Contract Documents are increased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

C. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. In the event it is determined by the Architect that subgrades will not pass compaction testing or proof roll when prepared in accordance with the specifications, subgrade repairs shall be performed on a Unit Price basis.

B. Unit Price 01: Reinforced Concrete Pavement - 7"
   1. Provide a $/SY unit cost for the installation of pavement per Civil.

C. Unit Cost 02: HMA Pavement - 2 1/2"
   1. Provide a $/SY unit cost for the installation of pavement per Civil.

D. Unit Price 03: HMA Pavement - 1 1/2"
   1. Provide a $/SY unit cost for the installation of pavement per Civil.

E. Unit Price 04: Reinforced Concrete Sidewalk Pavement - 4"
   1. Provide a $/SY unit cost for the installation of pavement per Civil.

END OF SECTION

SECTION 012300

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

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.

E. Order of Alternates listed in the Schedule of Alternates does not indicate which order Alternates will be accepted.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate Bid No. 1: (DEDUCTIVE) MAINTENANCE BUILDING
Reduce two (2) structural bays (two stalls) from the bus garage and reduce one (1) structural bay (two stalls) from the small vehicle garage. At the bus garage, PEMB manufacturer to engineer the west end wall and exterior canopy to allow for a future expansion of two (2) structural bays at the west end. See drawing set.

B. Alternate Bid No. 2: (DEDUCTIVE) ADMINISTRATION BUILDING
Partially build out/partially unfinish second floor per sheet A111 and associated engineering/building systems sheets. See drawing set.

C.

END OF SECTION

SECTION 012500

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:
   1. Division 01 Section "Alternates".
   2. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
   3. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

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 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 found at end of section.
   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 modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. 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.
      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.
      a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

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 qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

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

PART 2 PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 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. Substitution request is fully documented and properly submitted.
      c. Requested substitution will not adversely affect Contractor's construction schedule.
      d. Requested substitution has received necessary approvals of authorities having jurisdiction.
      e. Requested substitution is compatible with other portions of the Work.
      f. Requested substitution has been coordinated with other portions of the Work.
      g. Requested substitution provides specified warranty.
      h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
   1. Conditions: Architect will consider Contractor's request for substitution when 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. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 EXECUTION - NOT USED

END OF SECTION

SUBSTITUTION REQUEST FORM

Project Name:

Request Date:

Requestor:

Spec Information: (Spec Section Title, No., Page, Paragraph)

Substitution No.:

PROPOSED SUBSTITUTION

The accompanying attachments provide a full description of the proposed substitution.

General Description:

Reason for Substitution:

Proposed Change to Contract Sum:	
	None
	Add
	Deduct
	Total

Proposed Change to Contract Time:	
	None
	Add
	Deduct
	Total

ASSUMPTION OF RESPONSIBILITY FOR EQUAL PERFORMANCE: *Requestor affirms that the proposed substitution conforms to required dimensions and meets or exceeds the standards of required function, appearance, and quality set by the specified product. Requestor understands and affirms compliance with the provisions of the relevant specification section.*

Requestor Name Requestor Signature Date

ARCHITECT'S EVALUATION

Substitution Determination:	**Accepted**	**As Noted**	**Rejected**

Remarks:

Name:

County Consent:

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination.
   2. Administrative and supervisory personnel.
   3. Project meetings.

B. Related Sections include the following:
   1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
   2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

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 with other contractors to ensure maximum 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 different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 PROJECT MEETINGS

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

B. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of

schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:
   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Work hours.
   10) Hazards and risks.
   11) Progress cleaning.
   12) Quality and work standards.
   13) Change Orders.

3. Reporting: The Owner's Representative/CEI (Construction, Engineering and Inspection Services) will record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 013200

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 1 Specification Sections, apply to this Section.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Preliminary Construction Schedule.
   2. Contractor's Construction Schedule.
   3. Submittals Schedule.

B. Related Sections include the following:
   1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
   2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
   3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.

1.3 SUBMITTALS

A. Submittals Schedule: Submit three copies of 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.

B. Preliminary Construction Schedule: Submit two opaque copies.
   1. Approval of cost-loaded preliminary construction schedule will not constitute approval of

Schedule of Values for cost-loaded activities.

C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, payment requests and other required schedules and reports.

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 30 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.

2.2 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary 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 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

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 Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, 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

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. Section Includes:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

B. Related Requirements:
   1. Section "Payment Procedures" for submitting Applications for Payment and the schedule of values found in the Escambia County Project Contract.
   2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
   3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
   5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.

1.3 DEFINITIONS

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

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

Specification Sections as "informational submittals."

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
   1. Project name.
   2. Date.
   3. Name of Architect.
   4. Name of Engineer.
   5. Name of Contractor.
   6. Name of firm or entity that prepared submittal.
   7. Names of subcontractor, manufacturer, and supplier.
   8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier for each submittal. Category and type of submittal.
   9. Submittal purpose and description.
   10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
   11. Drawing number and detail references, as appropriate.
   12. Indication of full or partial submittal.
   13. Location(s) where product is to be installed, as appropriate.
   14. Other necessary identification.
   15. Remarks.
   16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Submittals:
   1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
   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. Action Submittals: Submit PDF copies of each submittal unless otherwise indicated to Owner's Representative/CEI. Owner's Representative/CEI will return an electronic copy. At Owner's Representative/CEI's discretion, ProCore or other electronic file transfer software may be used.
   4. Informational Submittals: Submit PDF copies of each submittal unless otherwise indicated. Owner's Representative/CEI will not return copies.
   5. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

E. PDF Submittals: Prepare submittals as PDF (Portable Document Format) package,

incorporating complete information into each PDF file. Name PDF file with submittal number in sequential order of submittal.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Email: Prepare submittals as PDF package, and transmit to Owner's Representative/CEI by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
      a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. 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 submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for 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 15 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 15 days for review of each resubmittal.

D. 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.

E. 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.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. 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 unsuitable 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 that show 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 Shop Drawings, and before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.

C. 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.

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

contact information of architects and owners, and other information specified.

E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

F. Certificates:
   1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
   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. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
   5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
   6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:
   1. 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.
   2. 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.
   3. 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.
   4. 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.

1.7 CONTRACTOR'S REVIEW

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

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 CEI'S REVIEW

A. Action Submittals: CEI will review each submittal, indicate corrections or revisions required, and return it.
   1. PDF Submittals: CEI will indicate, via markup on each submittal, the appropriate action.

B. Informational Submittals: CEI will review each submittal and will not return it, or will return it if it does not comply with requirements. CEI will forward each submittal to appropriate party.

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

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. CEI will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by CEI without action.

1.9 ARCHITECT'S REVIEW

A. CEI will submit PDF copies of each submittal unless otherwise indicated to Architect. Architect will return an electronic copy to the CEI.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 014000

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

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, or authorities having jurisdiction are not limited by provisions of this Section.

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. Product Testing: Tests and inspections that are performed by an NRTL (Nationally Recognized Testing Laboratory), an NVLAP (National Voluntary Laboratory Accreditation Program), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

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

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

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

G. 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).

H. 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 INFORMATIONAL SUBMITTALS

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

B. 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.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Refer to County Specifications.

1.7 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.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with

requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

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

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

1.8 QUALITY ASSURANCE

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

B. 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.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. 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.

E. 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.

F. 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.

G. 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.

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

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   5. 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 013300 "Submittal Procedures."

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

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for

construction that replaced Work that failed to comply with the Contract Documents.

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

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Preliminary design mix proposed for use for Facilities for storage and field curing of test samples material mixes that require control by testing agency.
   5. 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. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
   1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 TESTING 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 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 017300 "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

SECTION 014200

REFERENCES

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

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," "approved," "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": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

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.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

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

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

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

B. Related Sections include the following:
1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Divisions 02 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 USE CHARGES

A. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

B. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA (National Electrical Contractors Association), NEMA (National Electrical Manufacturers Association), and UL (Underwriters Laboratories) standards and regulations for temporary electric service. Install service to comply with NFPA (National Electrical Contractors Association) 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber and Plywood: Comply with requirements in Division 6 Section "Miscellaneous Rough Carpentry."

B. Gypsum Board: Type "X', minimum 5/8 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM (American Society for Testing and Materials) C 36.

C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 EQUIPMENT

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

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Provide and use negative air machines in individual work areas.

F. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

G. Electric Power Service: Provide electric power distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Connect temporary service to Owner's existing power source, as directed by Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   2. Install lighting for Project identification sign.

3.3 SUPPORT FACILITIES INSTALLATION

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

B. Parking: Use Owner's designated parking lot for parking.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

D. Dumpster: The General Contractor shall provide and maintain the dumpster. The dumpster should be placed on grade where directed by the Owner.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Division 1 Section "Summary."

B. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Temporary Partitions: Provide floor-to-concrete floor structure above dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise. Provide temporary partitions and "anti-rooms" at each individual construction work area.
   1. Construct dustproof partitions with gypsum wallboard with joints taped on both sides and insulation in the cavity. Provide "Anti-Rooms" at entrance to each individual construction work area to allow removal of dust and debris and decontamination when leaving individual construction work areas.
   2. Insulate partitions to provide noise protection to occupied areas.
   3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   4. Protect air-handling equipment.

5. Weather strip openings.
6. Provide walk-off mats at each entrance through temporary partition.

E. Negative Air Machines: Provide and maintain Negative Air Machines in each separate construction work area.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

G. Project Site Perimeter Fence - Owner will provide temporary construction fence around the extent of the project site throughout the construction phase or until it is replaced by permanent site fencing.

3.5 OPERATION, TERMINATION, AND REMOVAL

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

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

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

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This 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; product substitutions; and comparable products.

B. Related Sections include the following:
1.
2. Division 01 Section "Alternates".
3. Division 01 Section "References" for applicable industry standards for products specified.
4. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.

1.3 DEFINITIONS

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

appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Materials and equipment submitted per "Substitution Procedures" 012500 and approved by Architect to meet performance characteristics of "basis of design" shall be accepted per "Substitution Procedures" 012500.

1.4 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.

B. Comparable Product 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.

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

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

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

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: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. 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.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
   3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
   4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
   5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
   6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
   7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
   8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
   9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
      a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
      b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 30 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

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

2.3 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 016100

OWNER DIRECT PURCHASING

PART 1 GENERAL

1.1 SUMMARY

A. This Section establishes procedures for materials and equipment that Escambia County Board of County Commissioners (County) elects to purchase directly for incorporation into or consumption in the Work. Direct purchase by the County is referred to as Owner Direct Purchasing (ODP).

B. The County may consider any construction material or equipment for ODP and does not expect to issue purchase orders for less than $15,000. Selection of items for ODP is at the County's discretion. The Contractor remains responsible for completion of the Work in accordance with the Contract Documents.

C. Apply this Section together with Section 2.2, Owner Direct Purchasing (ODP) Notification, in the Bid Package 2 Scope of Work. If a requirement of this Section conflicts with Section 2.2, Section 2.2 governs; notify the County of the discrepancy before the affected purchase proceeds.

D. Escambia County Technical Specifications, latest edition.

E. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 CONTRACTOR SUBMITTALS AND RECORDS

A. At the same time as the preliminary Schedule of Values and project Critical Path Method (CPM) schedule, submit a list of intended suppliers for the County's consideration for ODP. For each proposed supplier, include its price quotation and negotiated terms and conditions, together with a description, quantities, and prices of the proposed materials or equipment. The separate award condition governing the bidder's Schedule of Values remains as stated in Section 2.5 of the Scope of Work.

B. Maintain records identifying ODP items received and incorporated into or consumed in the Work. Provide the County with a monthly accounting of ODP items, including purchases, receipts, installation or consumption, and items remaining, as applicable.

1.3 SUPPLIER SELECTION AND BID BASIS

A. Select material suppliers using competitive bids or proposals. Award supply contracts to the suppliers whose bids or proposals are most advantageous to the County, considering price and other relevant aspects.

B. Include the price of all construction materials and equipment in the lump sum bid, together with Florida sales taxes and other taxes normally applicable to those materials and equipment. Do not omit an item or its normally applicable taxes from the bid on the assumption that the County will purchase it directly.

C. Administer each material or equipment purchase selected for ODP through a deductive Change Order in accordance with the Contract Documents. Identify the selected item and the corresponding amount included in the Contract Sum, including normally applicable taxes, so the direct purchase is not paid for twice. Address any adjustment to other Contract Sum components only as provided by the Contract Documents and the Change Order.

1.4 COUNTY PURCHASE ORDER & PAYMENT

A. The County shall issue its own purchase order for each ODP. The purchase order package shall include the County's Certificate of Entitlement (OF0195) as an attachment in accordance with Rule 12A-1.094, Florida Administrative Code.

B. ODP suppliers shall invoice the County directly. The County shall remit payment directly to the ODP suppliers. Contractor payment applications shall reflect the applicable deductive Change Orders and shall not request payment for County purchased materials or equipment.

PART 2 PRODUCTS

2.1 MATERIALS & EQUIPMENT

A. The following materials may be considered for ODP:
   1. HVAC Units
   2. HVAC Controls
   3. CMU Brick
   4. CMU Mortar
   5. CMU Grout
   6. Electrical Switch Gear
   7. Fencing
   8. Access Control Gates
   9. PEMB
   10. Fuel Station Canopies
   11. Transfer Center Canopy
   12. Concrete
   13. High Volume Low Velocity Fans
   14. Asphalt

15. Dense Graded Aggregate
16. Bus Wash Equipment
17. Fill Dirt
18. Vacuum System
19. Fuel Pumps
20. Fuel Tanks
21. Radio System

B. Select materials and equipment that comply with the Contract Documents. The Contractor is responsible for supplier selection, specifications, receipt of materials, shipment inspection, and determining that the material or service paid for by the County is appropriate for the construction.

PART 3 EXECUTION

3.1 SCHEDULING & DELIVERY

A. Maintain the project schedule and coordinate performance of the terms and conditions of each ODP purchase order, including expediting supplier deliveries. Incorporate ODP procurement, delivery, inspection, and installation into the CPM schedule and updates as applicable.

3.2 RECEIPT & INSPECTION

A. Receive and inspect ODP goods and accompanying shipping documents. Verify that quantities and goods received conform to the purchase order and the Contract Documents. Document receipt and inspection.

B. Notify the County of goods received that are damaged or do not comply with the specifications and facilitate timely replacement. Coordinate with the supplier and the County to resolve discrepancies without losing responsibility for the project schedule or acceptable finished Work.

3.3 RECEIVING REPORTS & ACCOUNTING

A. Approve receiving reports for goods received in accordance with the specifications and forward approved reports to the Clerk of the Court/Accounts Payable for processing of supplier invoices. Reconcile the receiving records with the monthly accounting.

3.4 INSTALLATION & WARRANTIES

A. Coordinate installation and incorporation of ODP materials and equipment into the Work. ODP does not reduce the Contractor's responsibility for an acceptable finished Project.

B. Obtain and manage warranties and guarantees for all materials and products specified in the Contract Documents, including those purchased directly by the County.

END OF SECTION

SECTION 017000

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. General installation of products.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

B. Related Sections include the following:
   1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
   2. Division 1 Section "Submittal Procedures" for submitting surveys.
   3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of improvements, utilities, and other construction indicated as existing are not guaranteed. The locations shown on the drawings are diagrammatic and are based upon the information available. The contractor shall adjust his work as necessary to avoid existing ducts, pipes, conduit, structural members and similar items not shown on the drawings. The contractor shall adjust and adapt his work to meet all existing conditions in the existing building without any additional cost to the Owner. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work. Notify the Architect of any significant deviation of existing items from indicated locations prior to performing the work.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities and other construction affecting the Work.

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

3.2 PREPARATION

A. 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.

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

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Architect promptly.

B. General: Lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

C. Building Lines and Levels: Locate and lay out control lines and levels for construction activities, including those required for mechanical and electrical work

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
   4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

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

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

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

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

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

requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages

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

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

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   4. The Owner will provide dumpsters for the Contractor's use.

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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

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.

3.6 STARTING AND ADJUSTING

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

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

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

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

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

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

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

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

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

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

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

END OF SECTION

SECTION 017310

CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

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 surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. 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. Operating elements include the following:
   1. Primary operational systems and equipment.
   2. Air or smoke barriers.
   3. Mechanical systems piping and ducts.
   4. Control systems.
   5. Communication systems.

6. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
   1. Water, moisture, or vapor barriers.
   2. Roofing membranes and flashings.
   3. Exterior wall construction.
   4. Equipment supports.
   5. Piping, ductwork, vessels, and equipment.

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

E. 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.

F. The General Contractor is responsible for all cutting and patching required by any trade on the job.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect 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.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. 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 prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut 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. 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 as small as possible, neatly to 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. 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.

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

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      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, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   4. Ceilings: 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.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Warranties.
   3. Final cleaning.

B. Related Sections include the following:
   1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
   2. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
   3. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Submit specific warranties, workmanship bonds, final certifications, and similar documents.
   3. Prepare and submit Project Record Documents, operation and maintenance manuals.
   4. Deliver tools, spare parts, extra materials, and similar items to location designated by

Owner. Label with manufacturer's name and model number where applicable.
5. Make final changeover of permanent locks and deliver keys to Owner.
6. Terminate and remove temporary facilities from Project site, construction tools, and similar elements.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

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

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction
1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling,

individual walls, floors, equipment, and building systems.

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

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (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.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION

3.1 FINAL CLEANING

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

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
      a. Clean Project site, and grounds, in areas disturbed by construction activities, of rubbish, waste material, litter, and other foreign substances.
      b. Remove tools, construction equipment, machinery, and surplus material from Project site.
      c. Remove debris and surface dust from limited access spaces.
      d. Sweep concrete floors broom clean in unoccupied spaces.
      e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
      f. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
      g. Remove labels that are not permanent.
      h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      i. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
      j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
      k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
      l. Clean ducts if units were operated without filters during construction.
      m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
      n. Leave Project clean and ready for occupancy.

END OF SECTION

SECTION 017823

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

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.
   6. Extra Materials

B. Related Sections:
   1. Division 01 Section "Submittal Procedures" for submitting electronic copies of submittals for operation and maintenance manuals.
   2. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

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. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in electronic format:

C. Initial Manual Submittal: Submit draft electronic copy of each manual at least 15 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 electronic 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 modify 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.

PART 2 PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: 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 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.
   3. Manual 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. Name and contact information for Commissioning Agent.
   9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   10. 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: Submit manuals in electronic form with labeled volumes.
   1. Drawings: Submit in electronic form.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor is 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.
6. Normal shutdown instructions.
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.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize electronic 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 electronic 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.
4. Material and chemical composition.
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.

2.5 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.

2.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 3 EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate electronic manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. 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.

D. 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.

E. Drawings: Prepare electronic 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.

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839

PROJECT RECORD DOCUMENTS

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.

B. Escambia County Technical Specifications, latest edition.

C. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 SUMMARY

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

B. Related Sections:
   1. Division 01 Section "Execution Requirements" for final property survey.
   2. Division 01 Section "Closeout Procedures" for general closeout procedures.
   3. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Submit in electronic format.

B. Record Specifications: Submit in electronic format Project's Specifications, including addenda and contract modifications.

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. Submit one electronic copy of the marked-up paper copies.
   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 Work 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. Utilize 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. 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. 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 and record Drawings where applicable.

B. Format: Submit record Specifications in electronic format.

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 modifications to project record documents as they occur; do not wait until the 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,

C.

D. 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

SECTION 024119

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Selective demolition.

B. Principal Products:
   1. Demolition of portions of designated structures.
   2. Disconnecting, capping, and demolition of identified utilities.
   3. Removing demolished materials from site.
   4. Protection of items to remain.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate utility and building service interruptions with Owner.
   1. Notify Owner seven days, minimum, before disrupting building fire protection and life safety systems.
   2. Schedule tie-ins to existing systems to minimize disruption.
   3. Coordinate Work so fire protection and life safety systems remain continuously operational in occupied areas.

B. Demolition Preparation Meeting:
   1. Conduct meeting one month, minimum, before starting Work of this Section.
   2. Additional Agenda Items:
      a. Demolition schedule.
      b. Existing conditions and structural load limitations.
      c. Protection plan for existing areas to remain.
      d. Noise and dust control procedures.
      e. Salvaged items to be returned to the Owner.

C. Schedule demolition Work to coincide with new construction.

1.3 ACTION SUBMITTALS

A. Shop Drawings:
   1. Show demolition and removal sequence.
   2. Show location of items designated for salvage.
   3. Show location and construction of temporary partitions.

B. Demolition Schedule: Overall schedule and interruptions required for utility and building services.

1.4 INFORMATIONAL SUBMITTALS

A. Reports of protection measures showing:
   1. Steps proposed for protecting individuals and property, environmental protection, dust and noise control.
   2. Protection measures for adjacent building areas.

B. Existing Conditions: Pre-demolition photos.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

1.6 FIELD CONDITIONS

A. Existing Conditions: Document adjacent building areas and site improvements, including finish surfaces that could be mistaken for damage caused by salvage and demolition.

PART 2 PRODUCTS

2.1 PERFORMANCE

A. Follow applicable code for demolition Work, dust control, and for products requiring utility disconnection and reconnection. Obtain required permits from authorities having jurisdiction.

B. Perform Work per State and Municipality standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing portions of buildings before demolition.

B. Verify hazardous materials abatement is complete before beginning demolition.

C. Notify Owner and Architect of suspected hazardous materials discovered during examination or demolition operations.

3.2 PREPARATION

A. Notify affected utility companies before starting Work; follow their requirements.

B. Mark location and termination of utilities.

C. Erect and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public and existing improvements indicated to remain.

D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches of any stressing tendon. Notify Architect three days in advance of cutting post-tensioned concrete.

E. Erect and maintain weatherproof closures for exterior openings.

F. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy.

G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

H. Provide appropriate temporary signage including signage for exit or building egress.

I. Do not close or obstruct building egress paths.

3.3 DEMOLITION

A. Demolition, General:
   1. Follow ANSI/ASSP A10.6 and NFPA 241.
   2. Conduct demolition to minimize interference with adjacent unaffected building areas.
   3. Demolish buildings and site improvements. Follow regulations and the following:
      a. Maintain portable fire suppression devices during flame-cutting operations.
      b. Maintain adequate ventilation when using cutting torches.
      c. Locate building demolition equipment and remove debris and materials. Do not impose excessive loads on supporting walls, floors, or framing.
      d. Loose Equipment, Furniture, and Materials: Contractor property; remove from site.
   4. Site Access and Temporary Controls:
      a. Maintain protected egress from and access to adjacent existing buildings.
      b. Do not close or obstruct streets, sidewalks, or adjacent facility access without permits.
      c. Limit dust and dirt spread during demolition. Comply with environmental regulations.

B. Disconnect and remove designated utilities within demolition areas. Cap and identify utilities at termination points.

C. Demolition sequence to protect existing improvements supporting structural members.

D. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations, until reinstalled.

E. Transport friable and dusty demolished materials through building in enclosed containers.

F. Remove temporary partitions.

3.4 CLEANING

A. Regularly clean up and remove demolished materials from site and legally dispose. Do not allow materials to accumulate on site.

B. Clean adjacent areas to existing condition prior to demolition work.

C. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

SECTION 031000

CONCRETE FORMING AND ACCESSOIRES

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide required formwork and related accessories for proper construction of cast-in-place structural concrete work. Design and engineering of the complete systems of formwork, shores, re-shores and back shores shall be the responsibility of the Contractor.

B. Work, items and requirements specified elsewhere that apply and/or relate to this Section include:
   1. Drilled Concrete Piers and Shafts - Section 31 63 29.
   2. Concrete Reinforcing - Section 03 20 00.
   3. Cast-In-Place Concrete - Section 03 30 00.

1.2 WORK INSTALLED BUT FURNISHED IN OTHER SECTIONS

A. Built-in-anchors, inserts and bolts for connection of other materials.

B. Built-in-sleeves.

1.3 QUALITY ASSURANCE

A. Work on this project shall comply with the following unless modified by requirements in the Contract Documents.
   1. ACI 301, “Specification for Structural Concrete” – (Latest Edition).
   2. ACI 117, “Specification for Tolerances for Concrete Construction and Materials”-(Latest Edition).
   3. ACI 347, “Guide to Formwork for Concrete” – (Latest Edition).

1.4 STORAGE OF MATERIALS

A. Store form materials and accessories on dunnage and under cover of protective sheeting.

PART 2 PRODUCTS

2.1 FORM FACING MATERIALS

A. Smooth Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

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

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

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Void Forms: Sizes as indicated on drawings.
   1. Provide and install a complete, closed cell, void form system that effectively isolates the structural/foundation elements from the soil. Provide all components, connectors, seam covers, tape, sealant, end closures, protective boards, moisture barriers, etc., necessary to complete the installation. Provide products suitable for use under the designated elements.
   2. Void form components shall consist of corrugated paper material with a moisture resistant exterior, and having an interior fabrication of a uniform cellular configuration that is composed of non-wax impregnated components. Void forms are temporary forms and shall decompose after placement of concrete. Void forms shall be biodegradable.
   3. Design void forms to fully support the weight of wet concrete shown in sections and details and temporary construction loading until the loads can be supported by the concrete structure.
   4. The manufacturer shall provide written confirmation of their product's ability to perform satisfactorily under the design conditions.
   5. Void forms for grade beams and walls shall be rectangular forms matching the width of grade beam or wall. Approved products include WallVoid and Seam Pads as manufactured by SureVoid Products, Inc., Englewood, CO. (800) 458-5444, or approved equal.
   6. Provide side retainer boards on each side of all pier caps, grade beams, and walls. Retainer boards shall be high-density polypropylene or high-density polyethylene, lightweight, flexible retainer block to prevent migration of backfill under suspended building foundation. Retainer shall extend above and below void form depth, have sufficient strength to resist lateral loads applied by soil, and be impact resistant. Retainer shall be capable of being exposed to earth and moisture without deterioration. Approved products include Backfill Retainer by SureVoid and SureRetainer by Motzblock, as supplied by SureVoid Products, Inc., (888) 803-8643, or approved equal.
   7. Voids that abut piers shall properly void the circular edge of all drilled piers. Use pre-manufactured, non-field cut, sealed void forms, with curved, radial, vertical edges adjacent to the piers. Approved products include ArcVoid and SureRound PierVoid as manufactured by SureVoid Products, Inc., Englewood, CO. (800) 458-5444, or approved

equal.

F. Pier Top Forms: Sizes (interior diameter) to match pier diameters shown on drawings. Provide cylindrical forms of sufficient strength to properly form upper portions of concrete piers without distortion. Approved products include Commercial Sure Tops as manufactured by SureVoid Products, Inc. (Englewood, Co. (800) 458-5444).

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

H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 SUBMITTALS

A. Submit in accordance with Division 1.

B. Product Data: For each type of forming product including all void form products and accessories. Product data shall indicate compliance with specifications, instructions for proper storage and installation, protection of materials from moisture prior to concrete pour and guidelines/instructions for evaluation of products if they are exposed to moisture.

PART 3 EXECUTION

3.1 CONSTRUCTION AND ERECTION

A. Construct forms in accordance with ACI 301. All elements of the forms, formwork, bracing and shoring shall consist of wood, metal or other manufactured products as specified above. Earth may not be used as a form, either directly or indirectly. Neither earth trenches nor earth trenches lined with another material are acceptable.

B. Build forms to conform to shapes, lines and dimensions of detailed member of concrete construction. Set to line and grade, and brace and secure to withstand placing of concrete and maintain their shape and position.

C. Construct forms with care to produce concrete surfaces without unsightly or objectionable form marking exposed concrete surfaces. Provide temporary inspection and clean out openings in bottom of wall and column forms and elsewhere as required by Architect. Seal joints after closing.

D. Thoroughly clean surfaces of form material and remove nails before reuse. Do not reuse damaged or worn forms. Coat contact surfaces of forms with non-staining form oil prior to placing metal reinforcement.

E. Install void form system in strict conformance with the manufacturer's recommendations.
   1. The manufacturer's representative shall conduct a pre-construction meeting to instruct the work force on proper storage, installation, and concrete placement.
   2. Properly void the circular edge of all drilled piers at the intersection with grade beams, walls, pier caps, or structural slabs. Use pre-manufactured, non-field cut, sealed void forms, with curved, radial, vertical edges adjacent to the piers.
   3. Cover all joints and seams, and seal all exposed ends, to eliminate concrete flow into the void.
   4. Install side retainers where rectangular forms have been used beneath pier caps, grade beams and walls.
   5. Protect slab forms from puncture and other damage during concrete placement with a layer of protective cover board (1/8" thick masonite or plywood sheet) over forms. Replace all units that become damaged prior to pouring concrete.
   6. Void forms shall remain dry during construction. Replace all units that are exposed to moisture.

F. Immediately before placing concrete, clean forms of chips, sawdust, and other debris. Immediately after removal of forms, remove form ties, wires and other defects and patch.

3.2 INSERTS AND ACCESSORIES

A. Make provisions for required installation of accessories, bolts, hangers, sleeves, anchor slots and inserts cast in concrete, as required by Drawings and other trades. Obtain suitable templates or instructions for installation of items. Place expansion joints where detailed and required.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.Retain option in first subparagraph below if adopting recommendation of ACI 347. ACI 301 requires concrete to reach its specified compressive strength.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances and floor flatness is complete. Revise first paragraph below if setting more detailed requirements such as a minimum number of floors.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 FIELD QUALITY CONTROL

A. The General Contractor shall perform a visual inspection of the void form installation prior to inspection by the testing laboratory.

B. Immediately prior to the concrete pour, the testing laboratory shall inspect the void form installation for size, placement, and quality of construction and materials. The testing laboratory shall review and inspect the following:
   1. Review manufacturer’s certification that units are designed to support the wet weight of the concrete.
   2. Confirm that the actual product used matches the product submittals.
   3. Verify size (both width and depth) of void forms.
   4. Confirm placement matches construction documents.
   5. Inspect the installation of void forms for tightness of fit, closure of ends, closure of circular formed edges adjacent to piers, adequacy of sealed seams and joints, firmness of installation (firm enough to prevent displacement during concrete placement), and integrity of units. Units that have been damaged by mechanical means or moisture shall be replaced.

END OF SECTION

SECTION 032000

CONCRETE REINFORCING

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide steel reinforcement for cast-in-place concrete and reinforced concrete masonry (CMU).

B. Work, items and requirements specified elsewhere that apply and/or relate to this Section include:
   1. Quality Control – Division 1
   2. Concrete Formwork - Section 03100.
   3. Cast-in-place concrete - Section 03300.
   4. Concrete Unit Masonry – 04200

1.2 SUBMITTALS

A. Shop Drawings: Submit in accordance with Division 1. Indicate complete reinforcing for each concrete member and CMU element including materials, sizes, bends, dimensions, bar schedules, stirrup spacing, and placing details. Shop drawings for reinforced CMU shall include wall elevations indicating placement of bars.

1.3 DELIVERY AND STORAGE

A. Stack reinforcing steel in tiers and mark so that each length, size, shape and location can be readily determined. Exercise care to maintain reinforcement free of dirt, mud, paint, rust, grease or oil.

1.4 RELATED SPECIFICATIONS

A. ACI 318 "Building Code Requirements for Structural Concrete", Latest Edition.

B. CRSI "Manual of Standard Practice" Latest Edition.

PART 2 PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars:
   1. Standard or Typical: ASTM A 615, Grade 60 deformed.
   2. High Strength: ASTM A 615, Grade 75 deformed, as noted on drawings.
   3. Epoxy-Coated Bars: ASTM A 615, Grade 60 deformed bars, and ASTM A 775, or ASTM

A 934, epoxy coated, with less than 2 percent damaged coating in each 12 inch bar length.

4. Weldable Reinforcing Bars: ASTM A 706. All welding of bars to conform to AWS D1.4.

B. Welded Wire Fabric: ASTM A185, as indicated on contract drawings.

C. Headed shear studs and headed shear stud assemblies (stud rails) required in concrete beams and slabs shall comply with ACI 3.5.5 and conform to ASTM A1044.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic or plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
   3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.2 FABRICATION

A. Fabricate reinforcing steel to sizes, shapes, and lengths detailed in accordance with requirements of ACI 318, and CRSI Manual of Standard Practice.

PART 3 EXECUTION

3.1 INSTALLATION

A. Accurately place reinforcing steel of sizes, shapes, lengths, spacing and other dimensions in accordance with approved Shop Drawings and CRSI Manual of Standard Practice. Before placing, thoroughly clean reinforcement of any coating which would reduce bonding. Do not heat, cut, or bend bars without Architect's approval. Do not splice reinforcement at points of maximum stress. Stagger splices in adjacent bars and provide a minimum overlap of 30-bar diameters at splices unless specifically noted otherwise on Drawings.

B. Securely tie at intersections with black annealed wire. Rigidly secure reinforcement in place during concrete placing. Provide concrete coverage for reinforcing as shown on Drawings.

C. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.2 FIELD QUALITY CONTROL

A. The General Contractor shall perform a visual inspection of all reinforcing steel for correctness

of placement, sizes, quantities, grades and supports, prior to the inspections performed by the Testing Agency.

B. The Contractor shall provide sufficient time between completion of placement of reinforcing steel and beginning of concreting to allow complete inspection by the Testing Agency and correction of all errors. Placement of reinforcing steel shall be complete prior to inspection by the Testing Agency. The Contractor shall give the Testing Agency at least 24 hours notice of when their services will be required.

C. The designated Testing and Inspection Agency shall perform the following reviews and inspections:
   1. The steel supplier shall furnish mill certificate reports (written in English) for the Testing Agencies' review.
   2. Prior to placement, visually inspect and report on size, type, grade and quality of materials.
   3. Observe and report on placement of reinforcement, including size, quantity, vertical location, horizontal location and spacing, correctness of bends, splices and clearances between bars and forms, firmness of installation, and security of supports and ties, immediately prior to concreting.
   4. Observe and report on placement of embedded items, including size, vertical location, horizontal spacing, correctness of fabrication, and firmness of installation immediately prior to concreting.
   5. Report to the Contractor, Architect, and Engineer all items that deviate from the Contract Documents and/or require clarification prior to concreting. Re-inspect these items after the Contractor has completed the correct installation, just prior to concreting.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SCOPE

A. Provide reinforced Cast-in-Place concrete work as indicated by the Contract Documents including:
   1. Structural concrete.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Testing Laboratory Services: Division 1

B. Concrete Forming and Accessories: Section 03 10 00

C. Concrete Reinforcing: Section 03 20 00

1.3 SUBMITTAL

A. Design of Concrete Mixes: Proposed mix designs shall be prepared and/or reviewed and approved for conformance to the Contract Documents by an independent testing laboratory. Submit the proposed mix designs and the testing laboratory's report to the Architect. Mix design methods shall be in accordance with ACI 318-Latest Edition.

1.4 COORDINATION

A. Notify responsible trades of schedules of concrete pours to allow adequate time for installation of their work.

1.5 RELATED SPECIFICATIONS

A. The specifications of the American Society for Testing Materials and ACI Standard 318-Latest Edition, "Building Code Requirements for Structural Concrete" are declared a part of this specification except as modified herein.

PART 2 PRODUCTS

2.1 MATERIALS

A. Portland cement: ASTM C-150, Type I, or Type II.

B. Fly Ash: ASTM C618, Class F (Class C and C/F blends will not be allowed). Maximum 20% of cementious material by weight. Fly ash shall not be used in architecturally exposed concrete without expressed approval of the Architect.

C. Normal Weight Aggregate: ASTM C-33. Provide aggregate from a single source. Free of materials with deleterious reactivity to alkali in cement.
   1. Fine Aggregate: Clean, hard durable, uncoated natural sand, free from silt, loam or clay.
   2. Coarse Aggregate: Hard, durable, uncoated crushed limestone.

D. Lightweight Aggregate: Expanded clay or shale coarse aggregate conforming to ASTM C-330. Free of materials with deleterious reactivity to alkali in cement.

E. Water: Potable.

F. Admixtures: The following admixtures may be used with approval from the Architect/Engineer (Do not use admixtures containing chloride ions):
   1. ASTM C-494 Type A (water-reducing)
   2. ASTM C-494 Type D (water-reducing and retarding)
   3. ASTM C-494 Type E (water-reducing and accelerating)
   4. ASTM C-494 Type F (high range water reducing (HRWR))
   5. ASTM C-260 Air-entraining

G. Vapor Retarder: 15 mil polyethylene sheet, type recommended for below-grade application and compatible waterproof tape.

H. Curing/Sealing Compounds: Non-yellowing clear acrylic, ASTM C-309. Verify compatibility with flooring materials and finishes.

2.2 PROPORTIONS AND MIXING

A. Proportions and Design:
   1. In accordance with approved mix design for each type of concrete scheduled.
   2. Admixtures: Introduce admixtures in quantities and according to methods recommended by admixture manufacturer. Add air-entraining agent to concrete type mixtures where required. Admixtures shall not be used except as specified in the approved mixed design.
   3. Strength:
      a. The strength of the concrete for each portion of the structure shall be as designated on the project drawings. Strength requirements shall be based on 28-day compressive strengths, unless high early strength is specified in which case required strengths shall be obtained at 7 days.
   4. Slump:
      a. Slump of concrete of normal weight as determined by "Method of Test for Slump of Portland Cement Concrete" (ASTM C-143), shall be as follows:
         SLUMP (INCHES)*

TYPE OF CONSTRUCTION	MAX.	MIN.
Slabs on Metal Deck	4"	2"
Drilled Piers	7"	5"
All Other Concrete	5"	2"

         * For Concrete to be vibrated

B. Mixing: Ready mixed concrete in accordance with ASTM C-94. Do not transport or use concrete after one and a half hours have elapsed from time of initial mixing. Supplier of transit-mixed concrete shall have a plant of sufficient capacity, and adequate transportation facilities to assure continuous delivery at required rate, so as to provide for continuous concrete placement throughout a pour.

2.3 SOURCE QUALITY CONTROL

A. Inspection and testing as specified in Division 1.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect foundations, forms, reinforcing steel, pipes, conduits, sleeves, hangers, anchors, inserts, damp-proofing and other work required to be built into concrete. Notify Architect at least one working day in advance of scheduled pour to allow time for adequate observations.

B. Correct unsatisfactory work prior to pouring concrete.

C. Remove ice and excess water from excavations and formwork.

3.2 CONCRETE PLACEMENT

A. Placing Concrete:
   1. Convey and place concrete in accordance with ACI 304, latest edition, and in such a manner that there will be no separation of ingredients and as specified below.

B. Consolidation:
   1. Use mechanical vibrating equipment for consolidation.
   2. Vertically insert and remove hand-held vibrators at 18" on center.
   3. Do not use vibrators to transport concrete in forms.
   4. Provide vibrators with minimum speed of 8000 RPM and with sufficient amplitude to consolidate concrete and work around reinforcement, embedded items and into corners of forms. Thoroughly consolidate layers of concrete with previous layers.

C. Construction Joints: Unless otherwise shown on Drawings, each footing, pier, column, beam, wall and slab shall be considered as a single unit of operation and shall be monolithic in construction. Where construction joints are absolutely unavoidable, locate joints at or near midpoints of spans where approved by Architect. Provide appropriate keys in construction joints, plumb level, whether horizontal or vertical. Place construction joints in exposed concrete work at detailed joints or rustications as approved by Architect.

D. Expansion Joint Fillers: Place premolded expansion joint fillers at location as detailed. Refer to Drawings for required joint dimensions.

E. Cold Weather Placement: Do not place concrete when temperature is below 40□ F unless cold weather concrete procedures are followed as specified in ACI 306. Calcium chloride or admixtures containing chloride ions shall not be used except where specifically approved by the Architect.

F. Hot Weather Placement: Exercise special care in accordance with ACI 305 to prevent high temperature in fresh concrete during hot weather. Use water-reducing/set-retarding admixtures in such quantities as especially recommended by the manufacturer to assure that concrete remains workable and lift lines will not be visible. Concrete having a temperature in excess of 95□F will not be permitted without containing a high range water reducing admixture and written certification from the concrete supplier of a successful record of the proposed mix design (Submit mix design with HRWR with a record indicating a maximum tested temperature for Architect/Engineer review prior to use). Cooling of water and/or aggregates will be required if concrete temperatures rise above this limit. When necessary, arrangements for installation of wind breaks, shading, fog spraying, sprinkling, ponding, or wet covering of a light color shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

G. Finishes:
1. Smooth-trowel finish: Concrete slabs which are to receive finish floor covering, as well as concrete floors, shall be smooth-trowel finished. Jitterbug or tamp surfaces, screed to proper elevation, then float with metal or wood floats. After concrete has set sufficiently to support weight, use mechanical floats for finish leveling. After water sheen has disappeared from surfaces, trowel with steel trowel to smooth surface free from blemishes and trowel marks. Perform final troweling after concrete is so hard that no mortar accumulates on trowel and a ringing sound is produced as trowels are drawn over surfaces.
2. Broom Finish: Flatwork shall be broom finished where noted specifically on Drawings. Jitterbug or tamp surfaces, screed to proper elevation, then float with wood floats to obtain a tight wood float finish. Prior to final set of concrete, brush concrete surfaces with a broom with grain running as directed, to a texture to match approved samples
3. Patch defective areas which do not match approved finish samples. Chip and patch with a mixture of cement and aggregate to match color of adjacent areas. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one (1) hour before being finally finished. The patched area shall be kept damp for seven (7) days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

H. Curing and Protection:
1. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures. Maintain concrete at a relatively constant temperature without drying for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
2. Curing shall immediately follow the finishing operation. Concrete shall be kept continuously wet by the method of sprinkling or curing compound for a period of not less than 6 days after placing.
3. During curing period, maintain above 70° F. for at least 3 days, or above 50° F. for at least 5 days. Spray compound on surfaces using two coats, applying second at right angle to first, at rate of 400 sq. ft. per gallon or as recommended by manufacturer. Restrict traffic on surfaces during cure to protect tracking off of protective film.

3.3 FIELD QUALITY CONTROL

A. Routine testing of materials, of proposed mix designs and of resulting concrete for compliance with technical requirements of the specifications shall be the duty of the testing agency.

B. Testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as any extra testing of concrete or materials occasioned by their failure to meet specification requirements, shall be at the Contractor's expense.

C. Contractor shall provide a secure and protected area for temporary on-site storage of concrete cylinders for initial curing.
1. On-site storage area shall meet the requirement of ASTM C31.
a. The storage area shall shield all specimens from direct sunlight.
b. The storage temperature shall be monitored and controlled as necessary to meet the temperature range specified in ASTM C31.

D. The Designated testing agency shall:
1. Test the Contractor's proposed materials for compliance with the Specifications.
2. Review and check the Contractor's proposed mix design.
3. Secure production samples of materials at plants or stockpiles during the course of the work and test for compliance with the Specifications.
4. Check batching and mixing operations to the extent deemed necessary to assure compliance with the Specifications.
5. Check slump consistency and uniformity of concrete to the extent deemed necessary to assure compliance with the Specifications.

6. Conduct strength test of the concrete in accordance with the following procedures.
   a. Secure composite samples in accordance with "Method of Sampling Fresh Concrete" (ASTM C-172). Each sample shall be obtained from a different batch of concrete on a representative, truly random basis. To be representative, the choice of times of sampling, or the batches of concrete to be sampled are to be made on the basis of chance alone, within the period of placement. Batches should not be sampled on the basis of appearance, convenience, or other possibly biased criteria. When pumping or pneumatic equipment is used, samples shall be taken at the discharge end. Water shall not be added to the concrete after the sample has been taken.
   b. Mold specimens from each sample in accordance with "Practice for Making and Curing Concrete Test Specimens in the Field" (ASTM C-31). Concrete for **[**drilled piers, grade beams and pier caps**] [**foundations, pedestals, pilasters and walls**]** shall be field cured under field conditions per ASTM C-31. The remainder may be laboratory cured under standard moisture and temperature conditions in accordance ASTM C-31.
   c. Per ACI 318, each strength test shall consist of the average of strengths of at least two 6x12 cylinders or at least three 4x8 cylinders. When using 6x12 cylinders, mold five specimens from each sample. When using 4x8 cylinders, mold eight specimens from each sample. The size and number of specimens shall remain constant for each class of concrete.
   d. Test specimens in accordance with "Methods of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C-39).
      1) When using 6x12 cylinders, test two specimens at 7 days and two at 28 days. Hold one cylinder for testing at Owner's discretion. The 7-day and 28-day test results shall be the averages of the strengths of the two specimens taken on that date.
      2) When using 4x8 cylinders, test three specimens at 7 days and three at 28 days. Hold two cylinders for testing at Owner's discretion The 7-day and 28-day test results shall be the averages of the strengths of the three specimens taken on that date.
      3) When early high strength concrete is required, additional specimens shall be taken and tested on the early date (two 6x12 specimens or three 4x8 specimens).
   e. Samples for strength tests of each class of concrete (each mix design) placed each day shall be taken not less than once a day, nor less than once for each 100 cu. yd. of concrete, nor less than once for each 5,000 sq. ft. of surface area for slabs or walls.
   f. If the total volume of concrete is such that the frequency of testing required above would produce less than five strength tests for a given class of concrete (mix design), tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
   g. Low strength test results will be investigated in accordance with ACI 318 methods. Acceptance of 56-day strength tests shall be at the Engineer's discretion and may not eliminate the need for other testing methods.
7. Determine air content of normal weight concrete on a regular and frequent basis in accordance with either ASTM test method.
8. Determine air content and unit weight of lightweight concrete on a regular and frequent basis in accordance with "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C-173) for air content and "Method of Test for Weight per Cubic Foot, Yield, and Air Content (Gravimetric) for Concrete (ASTM C-138) for unit weight.
9. Report temperature of concrete at the time of placing on a regular and frequent basis.
10. Report total water quantity added to batches, including that added after departure of concrete trucks from batch plant.
11. Report all test results to the Architect/Engineer and the Contractor on the same day that test results are made.

E. Measure floor and slab flatness and levelness according to ASTM E1155 within 24 hours after placement, and report to the Architect and Owner as soon as possible, but no later than 72 hours after placement. Tests for acceptance shall be performed before stressing post-tensioning tendons (if any), and before forms and shoring have been removed. As a practical matter, measurements may need to be made within a few hours after placement to avoid conflicts with staging and sequencing.

3.4 AUTHORITY AND DUTIES OF TESTING AGENCY

A. Technicians representing the testing agency shall inspect the materials and the manufacture of concrete and shall report their findings to the Architect/Engineer and the Contractor. When it appears that the material or work performed by the Contractor fails to fulfill specification requirements, the technician shall direct the attention of the Architect/Engineer and the Contractor to such failure.

B. The technician shall not act as foreman or perform other duties for the Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such is discovered, nor shall it obligate the Architect/Engineer for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or replace any requirements of the plans and specifications, nor to approve or accept any portion of the work.

END OF SECTION

SECTION 041000

MORTAR AND GROUT

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide mortar for unit masonry construction, and provide grout for reinforced masonry construction.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Testing and laboratory control - Division 1.

B. Concrete unit masonry - Section 042000.

C. Joint sealant - Division 7.

1.3 QUALITY ASSURANCE

A. Reference Standards:
   1. ASTM C91 - Masonry Cement.
   2. ASTM C144 - Aggregate for Masonry Mortar.
   3. ASTM C150 - Portland Cement.
   4. ASTM C207 - Hydrated Lime for Masonry Purposes.
   5. ASTM C270 - Mortar for Unit Masonry.
   6. ASTM C404 - Aggregates for Masonry Grout.
   7. ASTM C476 - Mortar and Grout for Reinforced Masonry.
   8. Source Quality Control:
      a. Mortar: Initial compressive strength laboratory tests in accordance with ASTM C270.
      b. Grout: Initial compressive strength tests in accordance with ASTM C476.

1.4 SUBMITTALS

A. Product Data: Submit in accordance with Division 1. Include product data sheets for each named product.

B. Test reports: Submit independent laboratory test reports of initial mortar and grout tests, including design mix proportions, for each mortar and grout.

C. Certification: Submit manufacturer’s certification that materials meet specification requirements.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver and store manufactured products in original, unopened containers.

B. Store cementitious ingredients in weather-tight enclosures and protect against contamination and warehouse set.

C. Stockpile and handle aggregates to prevent contamination from foreign materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Refer to Section 042000 for Hot Weather Construction and Cold Weather Construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, II or III.

B. Masonry Cement: ASTM C91, Trinity Mix Masonry Cement by General Portland, Inc.

C. Hydrated Lime: ASTM C207, Type S.

D. Sand: ASTM C144, gradation in accordance with BIA M1.

E. Coarse Aggregate: ASTM C404, maximum size 3/8 in.

F. Water: Clean and potable, free of organic matter.

G. Workability Additive: “A” Marble Dust by Armco Steel Corp., Piqua Quarries; or Ute Dolomite Limestone by U.S. Lime Div. of Flintkote Corp.; or Micro Fill 2 by Pure Stone Co., Marble Falls, Texas.

H. Water Proofing Compound: Omicron by Master Builders Co.

I. Mortar Color: Finely ground mineral pigment of high purity, non-fading, lime-proof, not detrimental to mortar, color as selected.

J. Grout Admixture: Fluidifier by Master Builders.

2.2 MIXES

A. Mortar Mix:
   1. ASTM C270, Type N.
      a. Minimum compressive strength of 750 psi in 28 days.
      b. Maximum air content 12%.
      c. Incorporate waterproofing admixture in mortar for exterior walls at rate of 1 lb. per bag of cement and 1 lb. per cu. ft. of lime.
   2. ASTM C476, Type M.
      a. Minimum compressive strength of 2500 psi in 28 days.
      b. Maximum air content 12%.

c. Incorporate waterproofing admixture in mortar for exterior walls at rate of 1 lb. per bag of cement and 1 lb. per cu. ft. of lime.

3. ASTM C476, Type S.
   a. Minimum compressive strength of 1800 psi in 28 days.
   b. Maximum air content 12%.
   c. Incorporated waterproofing admixture in mortar for exterior walls at rate of 1 lb. per bag of cement and 1 lb. per cu. ft. of lime.
4. Mortar Color for exposed to view masonry - as required to produce mortar as established by sample wall.
5. Masonry cement will not be allowed in mortar types M or S.

B. Grout Mix:
1. ASTM C476, fine grout.
2. Minimum compressive strength of 2500 psi in 28 days.
3. Incorporate Grout Admixture in grout for reinforced CMU walls - 1 lb. per 100 lbs. cement.

C. Mixing Procedures - Mortar and Grout:
1. Measure materials by volume or equivalent weight.
2. Mix cementitious materials and aggregate for 3 to 5 minutes in a mechanical batch mixer.
3. Add maximum amount of water to produce workable consistency.
4. For facing work add Mortar Color, as selected, and white cement to produce mortar as established by sample.
5. If mortar begins to stiffen from evaporation or absorption of a part of mixing water, re-temper by adding water and remix.
6. Grout shall have a slump of 10-1/2 to 11 in. at time of placement.
7. Use mortar and grout within 2-1/2 hours of initial mixing.
8. Do not use mortar or grout after it has begun to set.

2.3 MORTAR SCHEDULE

A. Exterior Non-Reinforced Masonry Walls - Type S Mortar.

B. Interior Non-Reinforced Masonry partitions - Type N Mortar.

C. Exterior and Interior Reinforced Masonry Walls - Type S Mortar.

PART 3 EXECUTION

3.1 INSTALLATION
A. Installation of mortar and grout is specified in Section 042000.

3.2 FIELD QUALITY CONTROL

A. Mortar: Control mortar batching by measuring materials by volume in accordance with approved mix design proportions.

B. Grout: Control grout batching by measuring materials by volume in accordance with approved mix design proportions.

C. Provide additional field quality control as specified in section 042000 Concrete Unit Masonry.

END OF SECTION

SECTION 042000

UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Ground face masonry block at exterior walls. - GFB.
2. Concrete block at exterior walls - CMU.
3. Glazed brick at interior walls in Administration Building - GB1.

B. Principal Products:
1. Architectural concrete masonry units.
2. Concrete masonry units.
3. Glazed face brick.
4. Mortar and grout.
5. Veneer anchors.
6. Sheet metal flashing.
7. Flexible flashing.
8. Cavity wall accessories.
9. Foamed-in-place masonry cell fill insulation.

C. Products Installed but not Furnished under This Section:
1. Steel lintels in unit masonry.
2. Steel shelf angles for supporting unit masonry.
3. Cavity wall insulation.

D. Related Requirements:
1. Section 014000: Mockup requirements.
2. Section 042200: Concrete unit masonry for structural CMU's.
3. Section 055000: Metal fabrications.
4. Section 071900: Water repellents.
5. Section 072100: Thermal insulation for mineral wool board.
6. Section 076200: Sheet metal flashing and trim.
7. Section 133419: Metal building systems.

1.2 DEFINITIONS

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

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

1.3 ACTION SUBMITTALS

A. Submittals, General: Follow TMS 602.

B. Product Data:

C. Shop Drawings:
   1. Masonry Units: Shapes, sizes, profiles, and coursing.
   2. Reinforcing Steel: ACI 315R, show placement of bars in masonry, including wall elevations.

D. Samples:
   1. Brick: Straps of five or more full sized units.
   2. Mortar color.
   3. Accessories: Vents and flashing.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Data substantiating compliance with requirements for the following:
   1. Brick: Size tolerance and Efflorescence.
   2. Mortar and Grout: Mix designs for compressive strength.

B. Delegated Design Submittals:
   1. Anchor design and calculations.

C. Qualification Statements: Installer.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Flashing Installers: Workers who have completed International Masonry Institute flashing upgrade course.
   2. Grout and Reinforcing Installers: Workers who have completed International Masonry Institute grouting and reinforced masonry upgrade course.

B. Mockup: Construct full thickness masonry wall containing all components required for finished construction.
   1. Mockup Size: 48 inches long by 60 inches high.
   2. Demonstrate:
      a. Supporting structure, including backup wythe, sheathing, and air barrier.
      b. Face wythe, including color, texture, coursing, and blending of masonry unis.
      c. Tooled mortar joints.
      d. Sealant-filled joints.
      e. Flashing, weep vents, and drainage material.
   3. Utilize stepped back technique, exposing each layer of construction.
   4. Approved mockup establishes work results standard.
   5. Remove mockup when Architect directs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Masonry Units: Store elevated above grade, protected from precipitation and stormwater runoff. Do not use wet units.
   2. Mortar and Grout: Store elevated above grade, protected from moisture. Do not use materials that have become damp.

1.7 FIELD CONDITIONS

A. Cold Weather: TMS 602.
   1. Do not use frozen or frost damaged materials.

B. Hot Weather: TMS 602.

PART 2 PRODUCTS

2.1 ARCHITECTURAL CONCRETE MASONRY UNITS

A. Ground Face CMUs, GFB: ASTM C90.
   1. General / Appearance: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90, manufactured using a combination of colored, tightly mixed aggregate to create a smooth ground face finish.
      a. Manufacturer and Product:
         1) Echelon, An Oldcastle Company; Masonry Units, as Basis-of-Design.
            a) WT-1: Dark-Architect selected.
            b) WT-2: Light-Architect selected.
            c) WT-3: Dark-Architect selected.
   2. Solid dry-cast, concrete facing units per ASTM C1634. All tests performed in accordance with ASTM C140.
   3. Integral Water Repellent: Concrete Masonry Units must include an integral water repellent admixture at the time of production.
   4. Color: As selected by Architect from manufacturers standard color range.
   5. Nominal Size: 8 inches high by 16 inches long.
      a. Width: 8 inches or 12 inches.

B. Standard CMUs, CMU: ASTM C90.
   1. Net Area CMU Compressive Strength: 2000 psi, minimum.
   2. Density Classification: Normal weight.
   3. Nominal Size: 8 inches high by 16 inches long.
      a. Width: 8 inches.

C. Shapes: See Drawings.
   1. Outside Corners: See Drawings.

D. Integral Water Repellent: Exposed units.
   1. Manufacturers and Products:
      a. Euclid Chemical, RainBloc System, as Basis-of-Design.
      b. ACM Chemistries RainBloc.
      c. GCP Applied Technologies Dry-Block.
   2. Walls Requiring Water Resistance: Units and mortar containing water repellent admixtures.

2.2 MASONRY LINTELS

A. Masonry Lintels: One of the following types.
   1. Concrete Lintels: ASTM C1623; precast or formed-in-place reinforced concrete.
   2. Masonry Lintels: Field-built or prefabricated reinforced, grouted, bond beam CMUs.
   3. Compressive Strength: Same as CMUs, minimum.

2.3 MODULAR FACE BRICK

A. Glazed Brick, Single-Fired, GB1: ASTM C1405.
   1. Products: See Finish Legend on Drawings.
   2. Grade: S.
   3. Type: I, single-faced units.
   4. Class: Interior.
   5. Division: Architect selected.
   6. Actual Size: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
   7. Color: Architect selected.

2.4 MORTAR AND GROUT - MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II.
   1. Cold Weather Applications: Type III.
   2. Color: White.

B. Hydrated Lime: ASTM C207, Type S.

C. Masonry Cement: ASTM C91.
   1. Manufacturers:
      a. Holcim.
      b. Lafarge North America.
      c. Lehigh Cement Company.
      d. National Cement Company.

D. Mortar Cement: ASTM C1329.
   1. Manufacturers:
      a. Lafarge North America.

E. Mortar Aggregate: ASTM C144.

F. Colored Mortar: Contractor option, provide mortar pigments, portland cement, and aggregates to create specified color or packaged colored mortar blend.
   1. Mortar Pigments: ASTM C979, products formulated for masonry mortar.
      a. Manufacturers and Products:
         1) Euclid Chemical Color-Crete, as Basis-of-Design.
         2) Davis Colors True Tone Mortar Colors.
         3) Lanxess Corp Bayferrox Iron Oxide Pigments.
         4) Solomon Colors SGS Mortar Colors.
   2. Color: Architect selected.

G. Grout Aggregate: ASTM C404, fine.

H. Cold Weather Admixture: Accelerating. ASTM C1384, nonchloride, noncorrosive.
   1. Conditions for use of cold-weather admixture is subject to approval of masonry manufacturer.
   2. Manufacturers and Products:
      a. Euclid Chemical ACCELGUARD 80.
      b. GCP Applied Technologies MORSET.
      c. Sika SikaRapid AC 534.

I. Water: Potable, free of substances that cause discoloration or adversely affect mortar setting or strength.

2.5 MORTAR AND GROUT - MIXES

A. Mortar Mixes: Portland cement-lime mortar, ASTM C270, Proportion Specification.
   1. Limit cementitious materials to lime and Portland cement.
      a. Exterior non-load-bearing, above-grade walls: Type N.
   2. Exterior walls: Water Repellent Admixture“RainBloc” mortar admixture, at CMU-01 masonry applications.
   3. Interior walls: Type N, unless otherwise indicated on Drawings.
   4. Parge Coats: Type N.

B. Do not use admixtures unless indicated as acceptable in the Contract Documents.
   1. Do not use calcium chloride in mortar or grout mixture.

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

D. Grout Mixes: ASTM C476; ASTM C476 and TMS 602, Table 1.15.1 for grout space and pour height dimensions.
   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 TMS 602 for dimensions of grout spaces and pour height.
   2. Provide consistency required at time of placement to fill completely all spaces indicated to be grouted.
   3. Grout Compressive Strength: 2000 psi, minimum and Match wall F'm compressive strength.
   4. Slump: 8 to 11 inches for low-lift grouting or 10 to 11 inches for high-lift grouting per ASTM C143.

2.6 STEEL MATERIALS

A. Steel Wire: ASTM A1064, hot-dip galvanized per ASTM A153.

B. Steel Sheet: ASTM A1008, Commercial Steel, hot-dip galvanized per ASTM A153.

C. Steel Plates, Shapes, and Bars: ASTM A36, hot-dip galvanized per ASTM A153.

D. Steel Anchors: ASTM B633 Class Fe/Zn 5 minimum, zinc-plated steel.

E. Stainless Steel Wire: ASTM A580, Type 304.

F. Stainless Steel Sheet: ASTM A666, Type 304.

G. Stainless Steel Anchors: ASTM F593 and ASTM F594, Alloy Group 1.

2.7 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, 60 ksi, deformed billet bars, galvanized finish.

B. Rebar Positioners: Preformed galvanized steel wire positioned in mortar beds to support reinforcing steel.
   1. Manufacturers and Products:
      a. Heckmann Building Products 376.
      b. Hohman & Barnard RB Series.
      c. Wire-Bond O-Ring Series.

2.8 JOINT REINFORCEMENT

A. Joint Reinforcement: ASTM A951.
   1. Interior Walls: Hot-dip galvanized, carbon steel.
   2. Exterior Walls: Hot-dip galvanized steel.
   3. Side Rod Wires: 0.148 inch diameter.
   4. Cross Rod Wires: 0.148 inch diameter.
   5. Length: 10 feet, minimum.
   6. Corners and Tees: Prefabricated.

B. Single Wythe Masonry Joint Reinforcement: Ladder type.
   1. Manufacturers and Products:
      a. 3GEN Masonry Products Ladder Reinforcing.
      b. Heckmann Building Products #1100.
      c. Hohmann & Barnard 220 Ladder Mesh.
      d. Wire-Bond Ladder 2 Wire.

C. Cavity Wall Joint Reinforcement:
   1. Ladder type, with adjustable height ties projecting into face wythe, pintle and eye connection to backup wythe.

2. Seismic Support: Continuous steel wire clipped to ties.
    a. Clip: Reinforcing manufacturer standard product.
3. Manufacturers and Products:
    a. 3GEN Masonry Products Ladder Eye.
    b. Hohmann & Barnard 270 Ladder Eye-Wire.
    c. Wire-Bond Ladder Hook & Eye.

2.9 VENEER ANCHORS

A. Veneer Anchors - General: Resist tension and compression forces perpendicular to wall plane.
    1. Performance: Withstand 100-lbf tension and compression loads without deforming.
    2. Veneer Tie Size: Extend to outer half of veneer, over 5/8 inch from outside face.
    3. Seismic Support: Continuous steel wires clipped to each veneer tie.
        a. Clip: Reinforcing manufacturer standard product.
        b. Seismic Veneer Tie:
            1) Manufacturers and Products:
                a) Hohmann & Barnard 2X Hook.

B. Steel Studs and Sheathing Attachment: One of the following types.
    1. Horizontal Plate Anchors: Horizontally oriented L shaped plate and wire tie, stainless steel, for screw attachment.
        a. Manufacturers and Products:
            1) 3GEN Masonry Products H-13-H.
            2) Heckmann Building Products Parts 213 and 282.
            3) Hohmann & Barnard HB-213.
            4) Wire-Bond RJ-711.
    2. Vertical Plate Anchors: Vertically oriented L shaped plates and trapezoidal wire ties, stainless steel, for screw attachment.
        a. Manufacturers and Products:
            1) 3GEN Masonry Products H-13-V.
            2) Hohmann & Barnard BL 407.
            3) PROSOCO Veneer-Tie.
            4) Wire-Bond 2407.
        b. Insulation Washers: Anchor manufacturer plastic wedge shaped insulation anchors.
            1) Hohmann & Barnard Blok-Lok Wedge-Lok.

2.10 WALL ANCHORS

A. Wall Top Anchors: Steel bracing, see Structural Drawings.
    1. Bent metal plate fit to width of wall, anchored to structure.
        a. Manufacturers and Products:
            1) Hohmann & Barnard PTA-422.
            2) Wire-Bond 4310.

B. Anchor Bolts: ASTM A307 Grade A, headed hot-dip galvanized steel bolts with hex nuts and flat washers.

C. Anchorage Devices: Expansion anchors or chemical anchors.
   1. Interior Locations: Zinc plated steel.
   2. Exterior Locations: Stainless Steel.

D. Rigid Thermal Break Material: Low thermal conductivity and high compressive strength reinforced, thermoset resin.
   1. Manufacturers and Products:
      a. Armatherm FRR TIM.
      b. ClimaSpec LLC CI Thermal Break.
      c. Fabreeka TIM.
      d. Thermal Bridging Solutions TBM-1.
   2. Thickness: See Drawings.
   3. Washers: Manufacturer 1/4 inch thick thermal break washers, in diameters based on structural bolt diameter.
   4. Bushings: Manufacturer elastomeric thermal break bushings, in lengths based on thickness of steel end plate and diameters based on structural bolt diameter.

2.11 SHEET METAL FLASHING

A. Stainless Steel Flashing:
   1. Stainless Steel Sheet: ASTM A240, Type 304, 0.016 inch thick.
   2. Solder: ASTM B32, Grade Sn60, flashing manufacturer recommended type.

B. Flashing Fabrication: Cut and form flashing as follows:
   1. End Dams: Extend flashing 6 inches minimum beyond lintels and turn edges up 2 inches minimum.
   2. Drip Edges: Extend flashing through veneer, turn down 45 degrees and hem edges.
   3. Cavity Wall Flashing: Extend flashing through outer wythe, across cavity, and turn up 8 inches minimum onto inner wythe.

2.12 FLEXIBLE FLASHING

A. Flexible Sheet Membrane Flashing: Self-adhering, composite polyethylene membrane laminated to butyl adhesive sheet and abrasion-resistant coating.
   1. Manufacturers and Products:
      a. 3GEN Masonry Products GENFLASH.
      b. Carlisle CCW BRT-801.
      c. GCP Applied Technologies Grace Ultra.
      d. Protecto Wrap Company Protecto Seal 45 Butyl.
      e. York Wicked Good Flashing.

B. Stainless Steel Drainage Flashing: Stainless steel sheet laminated to drainage fabric on one side.
   1. Manufacturers and Products:
      a. York Manufacturing York Flash Vent.

C. Flashing Accessories: Flashing manufacturer products required for complete installation:
   1. Termination Bars: Aluminum and Stainless Steel.
   2. Preformed corners, end dams, special shapes, and seaming materials.
   3. Adhesives and primers.

2.13 CAVITY WALL ACCESSORIES

A. Plastic Mesh Weep Vents:
   1. Manufacturers and Products:
      a. Advanced Building Products Mortar Break Weep Mesh.
      b. CavClear Weep Vents.
      c. Hohmann & Barnard Mortar Trap Weep Vents.
      d. Mortar Net Weep Vents.
      e. York Weep Vents.
   2. Size: Full head joint height and depth.
   3. Color: Match mortar color.

B. Mortar Control: Mesh panels, full cavity depth, full wall height.
   1. Manufacturers and Products:
      a. Advanced Building Products Mortairvent CW.
      b. CavClear Masonry Mat.
      c. Mortar Net USA WallNet.
      d. York Weep Armor.

2.14 FOAMED-IN-PLACE MASONRY CELL FILL INSULATION

A. Basis-of-Design Product: Subject to compliance with requirements, provide “Core-Fill 500” as manufactured by Tailored Chemical Products, Inc. Comparable products from other manufacturers, meeting specified requirements, will be considered when submitted to and accepted by Architect.
   1. General Description: Cell fill insulation shall be a two-component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
   2. Product Characteristics:
      a. Thermal Values: "R" Value of 4.91/inch @ 32 degrees F mean; ASTM C-177.
      b. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 53 and a minimum Outdoor Indoor Transmission Class ("OITC") rating of 44 for 8" wall assembly (ASTM E 90-90).

B. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.
   1. Surface Burning Characteristics: Maximum flame spread, smoke developed, and fuel contributed of 0, 5 and 0 respectively when tested in accordance with ASTM E 84.
   2. Combustion Characteristics: Must be noncombustible, Class A building material.

2.15 MINERAL WOOL INSULATION

A. Unfaced, Rigid Glass Mineral Wool Board Insulation: ASTM C 612, Type IVB; with maximum flame spread and smoke developed indexes of 0 and 0, respectively, per UL 723 Certification, passing ASTM E 136 for non-combustion characteristics.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide the following or equal:
      a. Roxul Inc; Cavity Rock DD.
      b. Thermafiber Inc.; an Owens Corning company.
   2. Nominal density of inner layer 4.1 lb/cu. ft. and of outer layer 6.2 lb/cu. ft.
   3. Thermal resistivity of 4.3 hr.sq.ft.F/Btu.
   4. Thickness: As required behind loose steel lintels.
   5. Width: 16 inches.

2.16 PERFORMANCE

A. Delegated Design:
   1. Delegate structural masonry design to anchor manufacturer licensed Structural Engineer.
   2. Structural Design Criteria: See Drawings.
   3. Structural Loads: See Drawings.
   4. Allowable Deflection: 1/600, maximum.
   5. Seismic Movement: ASCE/SEI 7.

B. Fire Resistance:
   1. Fire-Rated Assemblies: ASTM E119.

2.17 ACCESSORIES

A. Control Joint Gaskets: Rubber material. Furnish with corner and tee accessories, heat or cement fused joints.

B. Compressible Filler: Closed cell neoprene; oversized 50 percent to joint width; self expanding.

C. Non-Acid Masonry Cleaners: Masonry unit manufacturer recommended product; not harmful to masonry or adjacent materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive Work.
   1. Verify foundations are within specified tolerances.
   2. Verify reinforcing is properly placed.
   3. Verify rough-in for piping and electrical systems are properly placed.

3.2 PREPARATION

A. Coordinate placement of anchors provided under other Sections.

3.3 INSTALLATION - GENERAL

A. Maintain masonry courses to uniform dimensions. Form uniform thickness vertical and horizontal joints.

B. Use full size units unless cutting is unavoidable. Cut units to provide clean, sharp, unchipped edges. Conceal cut edges wherever possible.

C. Blending Exposed Masonry: Mix units to produce uniform blend of colors and textures.

D. Protection During Installation: Cover open masonry walls, projections, and sills when work is not in progress; utilize waterproof membrane.
   1. Extend protection 24 inches, minimum, on both sides of wall.

E. Stain Prevention: Immediately remove mortar and soil.
   1. Protect in place construction from mortar droppings.
   2. Protect walls from rain water splashing up from ground or scaffold.

3.4 INSTALLATION OF MASONRY VENEER

A. Facing Units:
   1. Bond: Lay exposed units in bond shown on Drawings.
   2. Mortar Joints: Tool to shown on Drawings profile.

B. Anchoring: Anchor masonry veneers to backup construction.
   1. Anchor Spacing:
      a. Space anchors 16 inches horizontally and 16 inches vertically.
   2. Seismic Reinforcement: Continuous horizontal wire attached to ties, installed in facing wythe.

3.5 FOAMED-IN-PLACE MASONRY CELL FILL INSULATION

A. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.

B. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

3.6 INSTALLATION OF CONTROL AND EXPANSION JOINTS

A. Expansion Joints in Brick:
   1. Compressible joint fillers built into masonry.
      a. Apply sealant to open joints.

3.7 INSTALLATION OF FLASHING, WEEPS, AND DRAINAGE

A. Install flashing in the following locations to effectively drain water from wall cavities.
   1. Where shown on Drawings.
   2. At obstructions to downward flow of water in wall.

B. Rigid Sheet Metal Flashing:
   1. Extend flashing horizontally through outer wythe, extend out beyond face and turn down and hem to form continuous drip edge.

C. Flexible Flashing:
   1. Install flexible flashing 1/2 inch back from outside face of exterior wall.
   2. Turn flashing up backup construction, 8 inches minimum and fully adhere to substrate and secure in termination bar.

D. Weep Vents: Full depth of head joints. Install where shown on Drawings and above flashing and below obstructions to upward flow of air in wall.
   1. Weep Vent Spacing: 24 inch centers.

E. Cavity Drainage Material: Place in cavities to maximize drainage.

3.8 INSTALLATION OF LINTELS

A. Install loose steel lintels over openings.

B. Bearing: 8 inches each side, minimum.

3.9 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Testing Frequency: One test for each 5000 sq ft of wall area.

C. Special Inspections: TMS 402, Level B.

D. CMU Compressive Strength Test: ASTM C140.

E. Mortar Tests: Test each mix provided per ASTM C780 to determine the following:
   1. Mortar Aggregate Ratio.
   2. Air Content.
   3. Consistency.
   4. Board life.

F. Grout Compressive Strength Test: ASTM C1019.

G. Non-Conforming Work: Make corrections or replace, and re-test.

3.10 REPAIRING AND POINTING

A. Repairing and Replacing:
   1. Remove and replace chipped, broken, or stained units.
   2. Remove and replace units that do not match adjacent units.
   3. Set replacement units in fresh mortar; point to eliminate evidence of replacement.

B. Pointing: Enlarge voids and holes and fill with mortar. Point joints to provide neat, uniform appearance.

3.11 CLEANING

A. In Progress Cleaning: Dry brush to remove excess mortar before tooling joints.

B. Final Cleaning: Clean exposed masonry as follows:
   1. Allow mortar to set and cure.
   2. Scrape to remove excess mortar.
   3. Clean brick by bucket-and-brush hand-cleaning method per BIA Technical Note 20.
   4. Clean brick by pressurized water cleaning method per BIA Technical Note 20.

C. Final Cleaning: Clean exposed masonry as follows:
   1. Allow mortar to set and cure.
   2. Scrape to remove excess mortar.
   3. Wet wall before applying cleaners.
   4. Clean masonry.
   5. Rinse cleaner from brick thoroughly.

3.12 PENETRATING WATER REPELLENT

A. Apply clear penetrating graffiti-resistant water repellent per Section 071900 "Water Repellents" to exterior surfaces of masonry identified on the Drawings.

END OF SECTION

SECTION 042200

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide concrete unit masonry construction, including reinforced concrete masonry construction.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Quality Control – Division 1.

B. Furnishing steel reinforcement in reinforced masonry - Section 032000.

C. Cast-in-Place Concrete - Section 033000.

D. Mortar and Grout for Concrete Unit Masonry - Section 041000.

E. Masonry Veneers and Masonry and Stone Assemblages – Division 4.

F. Steel lintels and shelf angles - Section 051000.

G. Nailers, blocking and rough hardware - Division 6.

H. Metal counterflashing - Division 7.

I. Sealants - Division 7.

1.3 SUBMITTALS

A. Certificates: Prior to delivery, submit certificates attesting compliance with applicable specifications for grades, types, classes and strengths of concrete masonry units.

B. Product Data: Submit manufacturer's product data sheets, in accordance with Division 1, for each proprietary product.

1.4 QUALITY ASSURANCE

A. Sample Wall
   1. Build sample wall, size 4 ft. x 4 ft., of concrete masonry for Architect's approval of workmanship. Sample wall to include selected bonding, tooled joints, quality of workmanship, typical reinforcement, ties, and grouting of reinforced masonry.
   2. Do not start work until Architect has accepted sample panel.

3. Use approved sample panel as standard to judge quality and workmanship of completed masonry work. Do not remove panel until work is completed and accepted.

B. Requirements of Regulatory Agencies: Construct masonry to meet requirements of:
   1. Local Building Code.
   2. "Specifications for Design and Construction of Load-Bearing Concrete Masonry", NCMA, latest edition.

C. Reference Standards:
   1. ASTM C90 - Hollow Load-Bearing Concrete Masonry.
   2. ASTM C145 - Solid Load-Bearing Concrete Masonry.
   3. ASTM D226 - Asphalt - Saturated Roofing Felt.
   4. ASTM D1751 - Preformed Expansion Joint Fillers.

D. Source Quality Control: Initial testing of masonry as specified in Division 1.

E. Allowable Tolerances:
   1. Maximum variation from plumb in vertical lines and surfaces of walls:
      a. 1/4 in. in 10 ft.
      b. 3/8 in. in a story height not to exceed 20 ft.
      c. 1/2 in. in 40 ft. or more.
   2. Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:
      a. 1/4 in. in 20 ft.
      b. 1/2 in. in 40 ft. or more.
   3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves, bed joints, top of bearing walls and other conspicuous lines:
      a. 1/4 in. in a bay, or 10 ft. maximum.
      b. 1/2 in. in 40 ft. or more.
   4. Maximum variation from plan location of related portions of columns, walls and partitions.
      a. 1/2 in. in a bay, or 20 ft. maximum.
      b. 3/4 in. in 40 ft. or more.
   5. Maximum variation in cross-sectional thicknesses of walls from dimensions shown on Drawings:
      a. Minus 1/4 in.
      b. Plus 1/2 in.
   6. Maximum variation in mortar joint thickness:
      a. bed: ±1/8"
      b. head: -1/4", +3/8"
      c. collar: -1/4", +3/8"

1.5 STORAGE OF MATERIALS

A. Do not use damaged masonry units, damaged components of structure or damaged packaged material.

B. Protect moisture controlled concrete masonry units and cementitious materials from precipitation or ground water. Store materials off the ground.

C. During freezing weather, protect masonry units with tarpaulins or other suitable material.

D. Do not use masonry materials that are contaminated.

E. Store different aggregates separately.

F. Protect reinforcement, ties and metal accessories from permanent distortions and store them off the ground.

1.6 JOB CONDITIONS

A. Protection of Work:
   1. During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown.
   2. Cover partially completed walls when work is not in progress.
   3. Extend cover minimum of 24 in. down both sides and hold cover securely in place.
   4. Protect door jambs and corners from damage during construction.
   5. Do not apply construction loads that exceed the safe superimposed load-carrying capacity of the masonry and shores, is used.

B. Staining:
   1. Prevent grout or mortar from staining face of masonry.
   2. Immediately remove grout or mortar in contact with face of masonry.
   3. Protect sills, ledges and projections from droppings of mortar.

C. Cold Weather Construction: Implement the following requirements when the ambient temperature falls below 40ºF, or when the temperature of masonry units is below 40ºF:
   1. Preparation:
      a. Remove ice or snow formed on masonry bed by carefully applying heat until top surface is dry.
      b. Remove frozen or damaged masonry.
   2. Products and Product Preparation:
      a. Use only dry masonry units.
      b. Do not lay masonry units having a temperature below 20ºF.
      c. Remove visible ice on masonry units before the unit is laid in the masonry.
      d. Heat mortar sand or mixing water to produce mortar temperatures between 40ºF and 120ºF at the time of mixing. Maintain mortar above freezing until used in masonry.
   3. Protection of Masonry Work While Under Construction:
      a. When ambient temperature is between 25ºF and 20ºF, use heat sources on both sides of the masonry under construction and install wind breaks when wind velocity is in excess of 15 mph.
      b. When ambient temperature is below 20ºF, provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32ºF within the enclosure.

4. Protection of Completed or Partially Completed Masonry:
   a. When mean daily temperature is between 40ºF and 32ºF, protect completed masonry from rain or snow by covering with a weather-resistive membrane for 24 hr. after construction.
   b. When mean daily temperature is between 32ºF and 25ºF, completely cover completed masonry with a weather-resistive membrane for 24 hr. after construction.
   c. When mean daily temperature is between 25ºF and 20ºF, completely cover completed masonry with insulating blankets or equal protection for 24 hr. after construction.
   d. When mean daily temperature is below 20ºF, maintain masonry temperature above 32ºF for 24 hr. after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods.

D. Hot Weather Construction: Implement approved hot weather procedures and comply with the following provisions:
   1. Preparation – Prior to conducting masonry work:
      a. When the ambient air temperature exceeds 100ºF, or exceeds 90ºF with a wind velocity greater than 8 mph:
         1) Maintain sand piles is a damp, loose condition.
         2) Provide necessary conditions and equipment to produce mortar having a temperature below 120ºF.
      b. When the ambient air temperature exceeds 115ºF, or exceeds 105ºF with a wind velocity greater than 8 mph, implement the requirements of section 1.06, D., 1., (a) and shade materials and mixing equipment from direct sunlight.
   2. Construction – While masonry work is in progress:
      a. When the ambient air temperature exceeds 100ºF, or exceeds 90ºF with a wind velocity greater that 8 mph:
         1) Maintain temperature of mortar and grout below 120ºF.
         2) Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
         3) Maintain mortar consistency by retempering with cool water.
         4) Use mortar within 2 hr. of initial mixing.
      b. When the ambient temperature exceeds 115ºF, or exceeds 105ºF with a wind velocity greater than 8 mph, implement the requirements of 1.06, D., 2., (a) and use cool mixing water for mortar and grout. Ice is permitted in the mixing water prior to use. Do not permit ice in the mixing water when added to the other mortar or grout materials.
   3. Protection: When the mean daily temperature exceeds 100ºF or exceeds 90ºF with a wind velocity greater than 8 mph, fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.

E Coordination:
   1. Coordinate opening sizes and locations of items and equipment built into masonry work.
   2. Coordinate and make provisions for installation of anchors, bolts, hangers, frames, insulation, dampproofing, and other items built into masonry work.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Units: ASTM C-90, Grade N, Type 1, lightweight aggregate, with a minimum 28-day compressive strength over net area of 2000 psi, unless noted otherwise on contract documents.

B. Solid Load Bearing Units: ASTM C-145, Grade P, Type 1, lightweight aggregate. Provide units with equivalent thickness required for 4-hour fire rating where shown on Drawings.

C. Nominal Face Dimension: 8 in. x 16 in. or 12 in. x 16 in.

D. Special Shapes: Furnish required sizes, shapes, lintels, pilasters, bond beams and miscellaneous shapes shown on Drawings or required to complete bond.

2.2 RELATED MATERIAL

A. Joint Reinforcement: Galvanized wire joint reinforcement of size and type shown on the contract documents by Hohmann & Barnard, Inc., Wire-Bond or Blok-Lok. Width 2" less than width of wall. Provide prefabricated corner and tee ties.

B. Dovetail Anchors:
   1. Corrugated Type: 16-ga. galvanized dovetail corrugated masonry anchors, 1 in. x 3-1/2 in.
   2. Triangular Wire Type: Dovetail triangular wire anchor, 3/16 in. galv. wire, 7 in. length, by Hohmann & Barnard, AA-200 by Blok-Lok of Texas or No. 103 by Heckman Bldg. Products, Inc.

C. Premolded Filler: Fibrous mastic strips, containing 35% to 50% asphaltic impregnation, ASTM D1751.

D. Control Joints: Rubber control joint specifically manufactured for sash block, complying with ASTM D-2000 2AA-805, 80 durometer: RS Series – Rubber Control Joint by Hohmann & Barnard, Inc., Block Seal for Sash Block by Williams Products, Rubber Control Joint by Wire-Bond.

E. Cleaner: Deox Chemical Cleaner by National Chemsearch Corp.; of Sure Kleen 600 by Process Solvent Co., Inc.

F. Thru-wall Flashing: Nervastral Seal-Pruf H-D, 20 mil elastomeric sheeting, by Rubber and Plastics Compound Col., Inc. or 20 mil. elastomeric sheeting, by Wasco Products, Inc.

G. Flashing Cement: Cement as recommended by manufacturer.

H. Weep Hole Material: 3/8 in. PVC tube.

I. Reglets: Type MA4 Masonry Reglet, 24 ga. galv. steel by Fry Reglet Corp.

J. Building Felt: No. 15 asphalt saturated felt, ASTM D-226.

K. Metal Lath: Flat expanded, diamond-shaped mesh, 3.4 lbs./sq. yd.,galvanized finish.

L. Pressure Relief Joints: 1/8 in. thick foam neoprene sheet.

M. Waterstop: Expand-O-Flash WS4-6-4 by Johns-Manville Co.

N. Mortar and Grout: Refer to section 041000.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine other construction which is to support or interface with masonry work. Where construction such as footing and shelves are not sound or level, where anchorage devices have not been installed, where interferences exist, or where there are other conditions unsuitable for proper installation or performance of masonry, do not start masonry work until other construction has been corrected.

3.2 PREPARATION

A. Refer to Section 1.06 for cold weather requirements and hot weather requirements.

3.3 BRACING

A. The masonry subcontractor shall design, provide, and install bracing that will assure stability of the masonry during construction. Bracing shall comply with the following:
   1. Selection of the bracing system is a part of the construction means, methods, techniques, sequences and/or procedures for which the Contractor and Subcontractor are responsible. As such, any required construction engineering and/or design resulting from these selections is the responsibility of the Masonry Subcontractor and shall be fully coordinated with the Contractor for conformance with the overall project construction requirements.
   2. The bracing system shall be capable of securing the masonry, or any partly constructed masonry, against loads comparable in intensity to those for which the structure was designed, resulting from wind, seismic forces and erection operations.
   3. Masonry walls have been designed to be braced by the permanent floor and roof framing. These walls, and the supporting foundations, have not been designed to allow the walls to cantilever above grade. Bracing of the walls, or partially completed walls, will be required to remain in place until all of the following conditions have been met:
      a. Masonry construction has been completed.
      b. The floor deck has been installed and the concrete has attained design strength.
      c. The roof deck has been installed and fully attached to all supporting members.
   4. Comply with OSHA and all governing code provisions.

B. Allow 16 hrs. to elapse after completion of masonry walls and columns before allowing construction of elements that impart uniform floor or roof loading.

C. Allow an additional 48 hrs. before allowing construction of concentrated loads on masonry walls and columns.

3.4 JOINT REINFORCEMENT AND ANCHORS

A. Joint Reinforcement: Provide continuous reinforcement in mortar joints of masonry walls as follows:
   1. Install continuous reinforcement at 16 in. o.c. vertical in concrete masonry walls, lap reinforcement as required by code and manufacturer.
   2. Provide supplemental reinforcing or ties required for grouting.
   3. Install prefabricated corner and tee ties at wall intersections.

B. Anchors:
   1. Install corrugated dovetail anchors at 16 in. o.c. in dovetail slots.
   2. Install dovetail triangular wire anchors at 16 in. o.c. in dovetail slots.
   3. Install other anchors and ties as shown on Drawings.

3.5 COURSING AND JOINTING

A. Lay up units with 3/8 in. bed and head joints, uniformly adjusted to produce specified coursing.

B. Lay units in common running bond unless otherwise noted.

C. Tightly tool sight exposed joints to a smooth, hard concave joint.

D. Compress and flush cut joints in unexposed work.

E. Provide sealant and caulking recess joints around outside perimeter of door and glazing frames and other wall openings. Rake joints to depth of 3/4 in. and width of 1/4 in.

F. Locate 3/8" wide control joints as indicated but do not exceed 35 feet on centers for exterior walls and 45 feet on center for interior partitions. Keep vertical joints straight, true and continuous from top to bottom of masonry.

G. Use sash units to form control joints and install continuous control joint filler with sash units tightly butted to compress neoprene flanges and completely seal joint. Where masonry abuts structural concrete or steel and control joint filler cannot be used, keep joint clean of mortar as work progresses.

H. Locate 1" wide building expansion joints as indicated and install expansion joint spacer properly recessed back from face to allow for sealant.

3.6 INSTALLATION

A. Lay block plumb and true to lines, with level courses, head joints lined up vertically. Use no more than one cut closure in a length of wall. Line up closures vertically.

B. Tap each unit to line and level as it is placed. Do not disturb units once in place, except to remove completely and set in fresh bed or mortar.

C. Do not pound corner and jambs to fit stretcher units after they have been set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.

D. Stop off horizontal run by racking back in each course; toothing is not permitted.

E. Make cuts with a power masonry saw. Do not use saw-cut faces in exposed work.

F. Lay up only block which have no chipped, cracked or discolored exposed faces. Lay up with good face showing.

G. Adjust shelf angle to keep work level and at proper elevation.

H. Provide pressure-relieving joints by placing a continuous 1/8 in. neoprene sheet under shelf angles.

I. All units shall be laid with full mortar beds on the face shells. All head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the longitudinal face shells.

J. End walls and cross webs forming cells to be filled shall be fully bedded in mortar to prevent leakage of grout unless the wall is to be poured solid.

K. Properly install lintels, pilaster units and other special units.

L. Use only dry concrete masonry units.

M. Keep cavities and grout spaces free of mortar droppings. As work progresses, trowel protruding mortar in cavity flat on the inner face of wythe.

3.7 ACCESSORIES

A. Weep Holes: Provide plastic tube weep holes in head joints at 24 in. o.c. where detailed and above wall flashing locations. Keep tubes free of mortar using sash cords.

B. Reglets: Install reglets continuously in mortar joints where counterflashing is required and detailed.

C. Metal Lath: Install continuously in cavities where required to retain grout or concrete for bond beams.

D. Waterstops: Install at expansion joints, lap joints in waterstop 3 in. shingle fashion.

3.8 REINFORCED MASONRY

A. Forms and Shores:
   1. Provide substantial and tight forms.
   2. Leakage of mortar or grout is not permitted.
   3. Brace or tie forms to maintain position and shape.
   4. Do not remove forms and shores until masonry has hardened sufficiently to carry its own weight and other temporary loads that may be placed on it during construction.
      (a) For girders, beams and arches: Minimum 10 days.
      (b) Under brick slabs or soffits: Minimum 7 days.

B. Steel Reinforcement: Place steel reinforcement in grouted spaces and bond beams as work progresses, as follows:
   1. Accurately position and secure against displacement from locations shown. Horizontal reinforcement may be placed as work progresses. All vertical reinforcing shall be in place prior to grouting and shall be held in position at top, bottom and at intervals not further apart than 192 bar diameters.
   2. Provide clear distance between vertical bars not less than 1-1/2 times bar diameter, nor less than 1-1/2 in.
   3. Provide not less than 1/4 in. thickness of grout between masonry units and reinforcement.
   4. Provide minimum width of collar joints containing both horizontal and vertical reinforcement of 1/2 in. larger than sum of diameters of horizontal and vertical reinforcement.
   5. Make splices in bars as shown on Drawings. Lapped splices for reinforcement shall not be less than 60 bar diameters. Provide lap splices of greater lengths when indicated on the drawings. Welded or mechanical splices shall develop the strength of the reinforcement.
   6. Do not bend reinforcement after it is embedded in grout or mortar.
   7. Place vertical bars within 2" of the required location along the length of the wall.
   8. Tolerance for placement of steel in walls, columns, lintels and bond beams is ±1/2".

C. Grouting:
   1. Fully grout cavities, pilasters and vertical cells of concrete masonry containing steel reinforcement. Fully grout bond beams and lintels. In addition fully grout cavities and cells as directed by the drawings.
   2. Wherever possible, place grout from inside face of masonry.
   3. Exercise extreme care to prevent grout from staining on face and top of masonry.
   4. Use coarse grout where grout space is 2 in. or more in width.
   5. Keep grout space clean of mortar and droppings.
   6. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical cell measuring not less than 2 inches by 3 inches.
   7. Provide cleanouts when required by grouting procedures specified below. Cleanout openings shall be provided at all cells to be filled at each pour of grout where such pour is in excess of four feet. Any overhanging mortar or other obstructions or debris shall be removed from the insides of such cell walls. Cleanouts shall be sealed after inspections and before grouting.
   8. Expanded metal mesh or other suitable material that will not interfere with bond may be laid on top of unit to permit bond beams and other horizontal members to be grouted without fully grouting the wall.

D. Low-Lift Grouting: (Hollow units)
   1. Units may be laid to a height not to exceed eight feet. If the height exceeds four feet, cleanouts must be used.
   2. Place vertical steel in cells with enough steel extending to provide proper lap splice.
   3. Grout cells in four feet high maximum lifts. Stop grout pour 1 1/2" below top of unit. All horizontal steel shall be fully embedded in grout.
   4. Stop grout 1 1/2" below top of masonry when grouting is to be stopped for 1 hour or more. All horizontal steel shall be fully embedded in grout.
   5. Agitate or puddle grout during and after placement to insure complete filling.
   6. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

E. High Lift Grouting: (Hollow units)
   1. Units may be laid to the full height of the wall and cleanouts shall be provided.
   2. Accurately position and support vertical steel in cells. Place steel with enough steel extending to provide proper lap splices if required.
   3. Grout cells in four feet high maximum lifts and provide special inspections during grouting. Stop grout pour 1 1/2" below top of unit. All horizontal steel shall be fully embedded in grout.
   4. Agitate or puddle grout during and after placement to insure complete filling.
   5. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

F. Multi-Wythe Grouted Construction
   1. Low-lift and high-lift grouted construction shall conform to the requirements of the International Building Code, Grouted Masonry.

3.9 WALL FLASHING

A. Place wall flashing over thin bed or mortar, sloping slightly to exterior. Place mortar over flashing to bed units above.

B. Seal penetrations in wall flashing with mastic. Extend wall flashing around outside of structural columns. Extend wall flashing 8 in. beyond lintels and sills and turn up ends to form a pan which directs moisture to exterior. Lap wall flashing vertical joints 4 in. Extend wall flashing to within 1/2 in. of exterior of mortar joint.

C. No horizontal joints or breaks allowed in wall flashing.

3.10 CONTROL OF MOVEMENT

A. At expansion joints, leave full width of joint free of masonry, mortar and reinforcement. Install joint filler material, recessed from face for sealant.

B. At control joints, insert preformed control joint material and leave joint free of masonry and reinforcement. Reinforcing and grout for bond beams at floor or roof shall be continuous thru the control joints.

C. Do not bond units to steel members. Wrap steel members enclosed in masonry with building felt. Maintain 1/2 in. clearance. Fill vertical clearances with premolded filler.

D. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or stone wedges, and fill top joint with mortar.

3.11 BUILDING IN OTHER WORK

A. Build in lintels, door frames, windows, flashing, reglets, inserts, anchors, blocking, sleeves, wall plugs, boxes, cabinets, piping, conduit and other items, whether provided as part of masonry work, as preparation for other work or furnished in other Sections.

B. Fully grout hollow metal door frames in masonry walls with mortar.

C. Provide passage for electrical and mechanical lines. Chase CMU in unexposed work, allow placement in walls where exposed. Cut neat holes for in-wall switches and cabinets. Make provisions for passage of lines, and other chases and openings, during laying up of masonry, so that later cutting is not necessary. Fill holes after lines and boxes are in place.

D. Provide special jamb units where required to execute window and control joint details. Maintain sealant clearances at door, window and other openings.

E. Provide lintels at openings of masonry work as necessary to form openings for in-wall equipment, through-wall ducts and piping, and as otherwise needed to support openings over 8 in. wide.

3.12 CLEANING AND POINTING

A. At completion of masonry work, inspect masonry for defective joints and damage masonry units.

B. Cut out and repoint defective joints. Fill holes and tool smooth.

C. Remove stained and damaged masonry units and replace with new units in fresh mortar bed, of color and tooling to match adjacent joints.

D. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.

E. Apply cleaning agent to 20 square feet sample wall area in location acceptable to Architect.

F. Apply cleaning agent as recommended by manufacturer. Do not use tools or solutions that would damage or stain masonry.

G. Do not proceed with cleaning until sample area is accepted.

H. Work small sections at a time; work from top to bottom.

I. Thoroughly rinse with clean water.

J. Protect adjacent materials which may corrode.

K. Leave work and surrounding surfaces clean and free of mortar spots, droppings and broken masonry.

3.13 FIELD QUALITY CONTROL

A. Determine the compressive strength of masonry by the unit strength method. Prior to construction, submit certificates for materials used in masonry construction indicating compliance with the Contract Documents.

B. As masonry begins, the testing lab shall verify that the following are in compliance:
   1. Proportions of site-prepared mortar.
   2. Construction of mortar joints.
   3. Location of reinforcement and connectors.

C. Prior to each grouting, the testing lab shall verify the following are in compliance:
   1. Grout space.
   2. Placement of reinforcement and connectors.
   3. Proportions of site-prepared grout.
   4. Construction of mortar joints.

D. The testing lab shall verify that grout placement is in compliance with the contract documents.

E. The testing lab shall observe preparation of grout specimens, mortar specimens, and/or prisms.

F. The lab shall submit written reports as directed in Division 1.

END OF SECTION

SECTION 051000

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 DESCRIPTION

A. Perform all work required to complete the Structural Steel work indicated by the Contract Documents and furnish all supplementary items necessary for its proper installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Test and Laboratory Control - Division 1

B. Steel Joists and Joist Girder Framing - Section 05 21 00

C. Metal Decking - Section 05 30 00

D. Miscellaneous Metal – Section 05 50 00

E. Metal Stairs – Section 05 51 00

1.3 QUALITY ASSURANCE

A. The testing laboratory approved by the Architect shall inspect high-strength bolted connections and welds and perform all tests in the shop and in the field and submit test reports to the Architect as hereinafter specified. The testing laboratory shall be responsible for conducting and interpreting the test, shall state in each report whether or not test specimens conform to all requirements of the Contract Documents, and shall specifically note any deviations therefrom. Corrective measures, including additional testing, which result from these tests, shall be the Contractor's responsibility.

B. The testing agency shall furnish to the Architect five (5) certified copies of all test reports.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Building Code shall mean Current Local Building Code.

B. AISC Specifications for Structural Steel shall mean AISC Specification for Structural Steel Buildings, March 9, 2005.

C. Specification for Structural Joints shall mean "Specifications for Structural Joints using ASTM A325 or A490 Bolts" June 30, 2004.

D. AWS Building Code shall mean AWS "Code for Welding in Building Construction", latest edition.

E. ASTM shall mean the appropriate specification of the American Society of Testing and Materials.

F. Code of Standard Practice shall mean AISC Code of Standard Practice for Steel Buildings and Bridges, latest edition.

1.5 QUALIFICATIONS

A. Steel Fabricator: Fabricator shall have not less than 10 years experience in the fabrication of structural steel.

B. Steel Erector: Erector shall have not less than 10 years experience in the erection of structural steel.

C. Welding procedures, welders, welding operations and tackers shall be qualified in accordance with the AWS Building Code. Certification of welders by the testing laboratory shall not be more than six months old at the time of welding in the erection period.

1.6 SUBMITTALS

A. Shop Drawings:
1. Submit shop drawings, indicating all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, rivets, and welds.
2. Schedule and submit shop drawings in a timely manner that allows the Architect and Engineer adequate time for review of the submittals. Refer to Division 1 for schedule and submittal requirements.
3. Shop drawings shall not be made by using reproductions of contract drawings. This restriction also prohibits using electronic files or reproductions of electronic files of the contract documents.
4. Dimensions to existing construction are based on the original construction documents and/or approximate field measurements. They are to be used for bid purposes only and not for shop drawing preparation or construction. The Contractor shall provide all field measurements required for proper fit up of members framing to and around existing construction.
5. All welds, both shop and field, shall be indicated by AWS Welding Symbols.
6. Highlight, encircle or otherwise identify deviations from the contract documents on submittals.
7. Divide or subdivide work into packages of reasonable size, sequence, and order. Each package shall be complete, including dimensioned plans with piece marks, and all pertinent framing and erection details, fabrication drawings of individual pieces, and bills of materials. Clearly identify each submittal package. Highlight, encircle or otherwise identify portions of the work that have been omitted and are to be included in other submittals.
8. Shop drawings shall be fully reviewed by the Contractor for completeness and conformance with the contract documents prior to submitting to the Architect. All submittals shall be stamped, initialed and dated by the Contractor. Submittals that have not been reviewed by the Contractor may be rejected without review.
9. Submittals that do not include all of the specified information may be rejected without review.

10. The Contractor shall fully coordinate the work of the fabricator with all other trades including the steel joist manufacturer. Provide joist placing drawings and lists to the steel fabricator for coordination of work prior to submittal of shop drawings to the Architect.
11. When re-submittals are required, highlight, encircle or otherwise clearly identify all changes, revisions, additions, or deletions of information since the previous submittal. Re-submittals shall be numbered, dated and descriptively identified in the title block of each revised sheet.
12. Any fabrication of material before approval of drawings will be at the risk of the Contractor.
13. Failure to comply with submittal and re-submittal requirements will be cause for rejection.

B. Erection Procedure: Submit descriptive data to illustrate the structural steel erection procedure, including sequence of erection and temporary staying and bracing.

C. Welding Procedure: Submit qualification of flux-cored arc welding procedures in accordance with Article 502, AWS D1-1.

D. Proof of Compliance for Materials:
1. Report of ladle analysis of all steel.
2. Report of tensile properties for;
   a. Steel shapes
   b. Steel bars
   c. Steel plates
3. Mill Certifications.

1.7 PROPOSED SUBSTITUTIONS

A. Substitutions of sections or modification of details, if proposed by the Contractor, shall be submitted for approval in sketch form prior to submission of shop drawings, and such substitutions shall be made only when approved by the Architect and Engineer. Refer to Division 1 for substitution submittal requirements.

1.8 PRODUCT HANDLING

A. Delivery of materials to be installed under other sections:
1. Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete or masonry construction shall be delivered to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.
2. Provide setting drawings, templates, and directions for the installation of the anchor bolts and other devices.
3. The General Contractor shall check the correct positioning of anchor bolts before concrete is placed. Subsequent displacement of the anchor bolts will be the responsibility of the General Contractor.

B. Storage of materials:
1. Structural steel members which are stored at the project site shall be above ground on platforms, skids, or other supports.
2. Steel shall be protected from corrosion.
3. Other materials shall be stored in a weather-tight and dry place, until ready for use in the

work.

4. Packaged material shall be stored in their original unbroken package or container.

PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Steel Shapes, Bars and Plates:
   1. W shapes shall conform to ASTM A992.
   2. All other steel shapes, bars and plates conform to ASTM A36.

B. Pipes and Tubes:
   1. Structural Steel Pipe shall conform to ASTM A501 or ASTM A53, Types E or S, Grade B.
   2. Structural Steel Tube shall conform to ASTM A500, Grade C.

C. Headed Stud Type Shear Connectors:
   1. Cold finished carbon steel, ASTM A108.
   2. Dimensions of shear connectors shall conform to Figure M-1 of AWS Building Code.

D. Anchor Rods – provide material as indicated on drawings:
   1. Conform to Section 1c of ASTM A307 for J bent rods.
   2. ASTM A449 where indicated in drawings.
   3. ASTM F1554, grade as noted in drawings.

E. High-Strength Threaded Fasteners: ASTM A325 or ASTM A490.

F. Filler Metal for Welding:
   1. Shielded metal - arc welding - AWS A5.1 or A5.5.
   2. Submerged - arc welding - AWS A5.17.
   3. Flux-cored arc welding - AWS A5.20.

G. Grout: Non-shrink grout "Embeco Pre-mixed Grout" by Master Builders or approved equal. The material shall be ready-to-use metallic aggregate product requiring only the addition of water at the job site, and shall produce a flowable grouting material having no drying shrinkage at any age. Compressive strength of grout (2"x2" cubes) shall be not less than 5000 psi at 7 days and 7500 psi at 28 days.

H. Paint: Fabricators standard rust inhibiting primer conforming to SSPC Specifications.
   1. Standard interior protected conditions (SSPC Zone 1A): Fabricators standard rust inhibiting primer conforming to SSPC Specifications.
   2. Exterior exposures (all exterior exposures shall be treated as SSPC Zone 2A): Provide primer compatible with paint system and topcoats specified in Division 9, and SSPC Specifications.
   3. Crawl space exposures (all steel within the building crawl space): All steel within the building crawl space shall be treated as exterior exposure SSPC Zone 1B. Provide primer and top coat (apply both coats at the shop) complying with SSPC Specifications, System

A or B and as follows:

a. For SSPC System A, Waterborne Acrylics: Provide two-coat waterborne acrylic latex (maintenance grade latex with at least 3 years documented service life, (e.g. SSPC Painting System 24.00).
b. For SSPC System B, Alkyd: Provide zinc-oxide alkyd primer (e.g. SSPC – Paint 25) plus alkyd or silicone-alkyd topcoat.

4. Architecturally Exposed Structural Steel (AESS): Treat AESS as having exterior exposure as noted above.

I. Galvanizing: Conform to ASTM A123/A123M

2.2 FABRICATION

A. Fabricate Structural Steel in accordance with the AISC Specification for Structural Steel.
1. All work shall be shop-assembled in so far as possible and delivered to the site ready for erection. Trusses shall be shop fabricated with field splices allowed only as indicated on the drawings or as approved in the substitution process. Material shall be properly marked and match-marked where field assembly is required. The sequence of shipments shall be such as to expedite erection and minimize field handling of material.
2. Members to be milled shall be completely assembled before milling.
3. Beams, girders, and trusses shall be cambered as indicated on the drawings. Specified camber shall be within a tolerance of minus zero to plus 1/8 inch per 10 feet of beam length. Members without specified camber shall be fabricated so that after erection any minor camber due to rolling or fabrication shall be upward.

B. Shop connections shall be high-strength bolted or welded, as indicated on the structural drawings or as required.

C. Field connections shall be high-strength bolted or welded, as indicated on the structural drawings or as required.

D. High-strength Bolted Construction Assembly: Tightening shall be done by the calibrated wrench method or the turn-of-the-nut method in accordance with Section 8 (d) of the Specifications for Structural Joints for all friction connections. For all bearing type bolted connections, bolts shall be installed to a snug tight fit with all plies in a joint in firm contact.

E. Welded Construction
1. All welding done in accordance with AWS D1.1.
2. Welding process shall be limited to one or more of the following:
a. Manual shielded-arc.
b. Submerged-arc.
c. Flux-cored arc.
3. Preheat and interpass temperature shall conform to Table 4.2, AWS D1.1.
4. Welds not specified shall be continuous fillet welds, using minimum fillet as specified by AWS D1.1.
5. Remove slag from welds and wire brush clean.

F. No combination of bolts and welds shall be used for stress transmission in the same faying face

of any connections.

G. Bearing Plates:
   1. Bearing plates shall be provided under beams, girders, and trusses resting on footings, piers, and walls.
   2. Bearing plates shall be either attached or loose.

H. Elements identified on the drawings as AESS are Architecturally Exposed Structural Steel. Fabrication of these elements shall comply with the Code of Standard Practice for Architecturally Exposed Structural Steel including the more restrictive tolerances for fabrication and appearance and with criteria noted on the drawings.

I. Shop Painting:
   1. Apply shop coat of paint on steel surfaces except:
      a. Surfaces of members to be field welded, in immediate area of welds.
      b. Surfaces of members to receive sprayed-on fireproofing.
   2. Surface preparation to be as follows:
      a. For standard interior protected uses: SP3 – Power Tool Cleaning.
      b. For exterior exposures: SP6 – Commercial Blast Cleaning.
      c. For crawl space exposures: SP6 – Commercial Blast Cleaning.
      d. For Architecturally Exposed Structural Steel (AESS): SP6 – Commercial Blast Cleaning.
   3. Repairing steel defects for both exterior exposures and for Architecturally Exposed Structural Steel: Weld spatter and other steel defects (e.g., scabs, burns, and slivers) that become visible after blast cleaning should be removed by sanding or grinding. All sharp edges or rough surfaces should be ground to a smooth contour (normally a 1/8 inch radius). Repaired areas should be restored to the original cleanliness and profile. This may be accomplished by spot air blast cleaning or vacuum blasting the damaged area or by use of profile producing power tools.

J. Galvanizing: Hot dip galvanize per ASTM A123/A 123M. Straighten steel after galvanizing to achieve specified tolerances.

2.3 SOURCE QUALITY CONTROL: The Steel fabricator shall provide certification of the following to the Testing Agency for their review:

A. Check steel plates and shapes for conformance to specifications.

B. Check High-strength threaded fasteners for conformance to the specifications.

C. Check filler metal for conformance to the specifications.

D. Determine chemical composition of all steel.

E. Determine mechanical properties, in accordance with ASTM A370, of the following materials:
   1. Steel shapes.
   2. Bars and plates.
   3. Headed stud type shear connectors.
   4. Anchor bolts.

5. High-strength threaded fasteners.
6. Filler metal for welding.

F. Qualification of shop bolting, welding, and stud welding and personnel:

G. Inspection of shop welds shall be in accordance with Section 6 of AWS Building Code and as follows:
1. Visual inspection of all shop welds in accordance with Article 605.
2. Ultrasonic testing in accordance with ASTM E164 of all penetration welds.

PART 3 EXECUTION

3.1 ERECTION

A. Erect structural steel in accordance with the AISC Specifications for Structural Steel, and the Code of Standard Practice for Steel Buildings and Bridges.

B. Selection of construction means, methods, techniques, sequences and/or procedures, as well as safety precautions and programs in connection with the Work, are solely the Contractor's rights and responsibilities. As such, any required construction engineering and/or design resulting from these selections is the responsibility of the Contractor.
1. Temporary supports, such as temporary guys, braces, falsework, cribbing or other elements required for the erection operation will be determined, furnished, and installed by the erector. These temporary supports shall be capable of securing the steel framing, or any partly assembled steel framing, against loads comparable in intensity to those for which the structure was designed, resulting from wind, seismic forces and erection operations.
2. The lifting and erection of pre-assembled elements such as trusses or pre-fabricated framing are considered special erection conditions. The selection of lift points, and erection techniques are the responsibility of the Contractor. Locate and provide sufficient lift points to prevent overstress and/or distortion of any components within the assembly. Provide temporary strong-backs, stiffeners and/or lifting devices as required.
3. Temporary supports of existing framing required to complete modifications and additions as shown in the drawings, are the responsibility of the Contractor. Provide shoring, braces, jacks, etc. as required to complete the work. Engineering and design of the temporary supports shall be performed by a professional engineer, engaged by the Contractor, and registered in the state of the project, with experience in the design of these elements.

C. Column Bases and Bearing Plates:
1. Attached column bases and bearing plates for beams and similar structural members shall be aligned with wedges and shims.
2. Loose column bases which are too heavy to be placed without a derrick or crane shall be set and wedged or shimmed or as noted on the structural drawings.

D. Erection Tolerances:
1. Individual pieces shall be erected so that deviation from plumb, level and alignment shall not exceed that specified in the AISC Code of Standard Practice, nor the following:
a. The displacement of the centerline of columns adjacent to elevator shaft, from the

established column line, shall be not more than 1 inch at any point.

b. The displacement of the centerline of exterior columns, from the established column line, shall be not more than 1 inch toward, nor 2 inches away from the building line at any point.

2. Elements identified on the drawings as AESS are Architecturally Exposed Structural Steel. Erection of these elements shall comply with the Code of Standard Practice for Architecturally Exposed Structural Steel (AESS) including the more restrictive tolerances for erection and appearance and with criteria noted on the drawings.

E. Field Assembly:
1. Structural steel frames shall be accurately assembled to the lines and elevations indicated, within the specified erection tolerances.
2. The Various members forming parts of a complete frame or structure after being assembled shall be aligned and adjusted accurately before being fastened.
3. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact.
4. Bearing surfaces and surfaces which will be in permanent contact shall be cleaned before the members are assembled.
5. Splices shall be permitted only where indicated.
6. Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged to admit bolts shall be reamed. Burning and drifting may be used to align unfair holes in secondary members only upon approval of the Architect.
7. Erection bolts used in welded construction may be either tightened securely and left in place or removed and the holes filled with plug welds.
8. Perform bolting and welding operations as specified in 2.02 Fabrication.

F. Gas Cutting: Field correcting of fabrication by gas cutting shall not be permitted on any major member in the structural framing without prior approval of the Architect.

G. Grouting of Base Plates and Bearing Plates: Plates shall be set and anchored to the proper line and elevation. Metal wedges, shims, and/or setting nuts shall be used for leveling and plumbing the structural members, including plumbing of columns. Concrete surfaces shall be rough, and shall be clean and free of oil, grease, and rust. The addition of water and mixing shall be in conformance with the material manufacturer's instructions. Grout shall be mixed by using a mortar mixer. Batches shall be of size to allow continuous placement of freshly mixed grout. Placing shall be quick and continuous. Exposed surfaces shall have smooth, dense finish.

H. Field Touch-up Painting: After erection of structural steel, touch-up field welds and abrasions in shop paint coating with same paint used for shop painting. Touch up welds in galvanized steel with a zinc rich paint.

3.2 FIELD QUALITY CONTROL: Testing agency shall perform the following:

A. Check bracing.

B. Check location and set of anchor bolts and other inserts.

C. Prior to attaching steel, check adjustments to fit accuracies.

D. Qualification of field bolting, welding, and stud welding procedures and personnel.

E. Inspection of the erected structural framework for conformance with the requirements specified, including alignment, plumb, camber, etc.

F. Inspection of Field Welds shall be in accordance with Section 6 of the AWS Building Code as follows:

1. Visual inspection of all welds in accordance with Article 605, of AWS.
2. All column-to-base plate field welds shall be inspected by ultrasonic testing in accordance with ASTM E164.
3. All welds that fail shall be re-welded and retested until they pass the test. The cost of the initial test and all further testing on welds that fail shall be borne by the Contractor. All initial weld tests that pass will be paid by the Owner.
4. All full and partial penetration welds shall be tested by ultrasonic testing.

G. Inspection of high-strength bolted construction shall be in accordance with Section 9, AISC Specifications for Structural Joints, and as follows:
   1. Friction Connections
      a. All high-strength bolted connections shall be visually inspected.
      b. At least two bolts of every third connection between floor beams and girders shall be checked with a calibrated torque wrench for proper torque.
      c. At least two bolts of every connection between girders and columns shall be checked as above.
      d. All bolted connections that fail shall be corrected and all bolts in that connection tests that fail shall be paid by the Owner. The cost of retests on connections that fail shall be borne by the contractor.
   2. Bearing Connections
      a. All high-strength bolted connections shall be visually inspected to ensure that all plies of the connected elements have been brought into snug contact.

H. Field testing of welded stud shear connectors shall be in accordance with sections 4.29 and 4.30 of the AWS Structural Welding Code, and as follows:
   1. Visual inspection shall be made for all studs for proper number and quality of welds. Any studs that do not have a full 360 degree fillet weld shall be tested.
   2. In addition to defective studs visually observed, a prescribed pattern of selecting studs for testing shall be followed.
      a. Any member having more than 20 studs shall have at least two studs tested.
      b. Members having less than 20 studs shall be tested as a group. Select two studs randomly from each sample of 100 studs to be tested.
   3. Testing shall consist of bending the stud to an angle of 30 degrees from its original axis by striking the stud with a hammer.
   4. If failure occurs during testing, inspector shall test adjacent studs as required to determine extent of poor welding.
   5. Stud replacement or repair shall be in accordance with AWS Structural Welding Code sections 4.29 and 4.30.

END OF SECTION

SECTION 052100

STEEL JOIST AND JOIST GIRDER FRAMING

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide Steel Joist and Joist Girder framing as indicated by the Contract Documents including supplementary items necessary for its proper installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Quality Control – Division 1.

B. Cast-In-Place Concrete – Section 03 30 0.

C. Concrete Unit Masonry – Section 04 20 00.

D. Structural Steel Framing – Section 05 10 00.

E. Metal Decking – Section 05 30 00.

1.3 REFERENCES

A. The term "Standard Specifications" as used herein shall refer to Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, Latest Edition, as adopted by the Steel Joist Institute and American Institute of Steel Construction.

1.4 PLACING DRAWINGS AND SUBMITTALS

A. The Contractor shall be fully, and solely responsible for the coordination of production, review, submittal and distribution of placing drawings and lists. Regardless of the method or source of production used for placing drawings and lists, the Contractor will be responsible for the completeness and accuracy of each submittal.

B. The Contractor shall provide appropriate parties with the construction documents necessary for the production of drawings and lists. The Contractor shall provide all field measurements required for proper fit up of members framing to and around existing construction.

C. Placing drawings and lists shall include framing plans, sections and details of construction, bill of materials, and lists or diagrams of special loading and design criteria. Drawings and lists shall indicate that the manufacturer is a member of the Steel Joist Institute. Submittals that do not include all of the specified information will be rejected without review.

D. Drawings and lists shall show the mark, number, type, location and spacing of all joists and joist girders. Show bridging type, mark, method of attachment to the joists and anchorage at the

ends. Indicate type of paint. Show and detail all accessories required for proper installation of joists and joists girders.

E. Placing drawings and lists shall be fully reviewed by the Contractor for completeness and conformance with the contract documents prior to submitting to the Architect. Submittals to the Architect shall be in conformance with Division 1. All submittals shall be stamped, initialed and dated by the Contractor. Submittals that have not been reviewed by the Contractor will be rejected without review.

F. The Contractor shall fully coordinate the work of the manufacturer with the steel fabricator. Provide placing drawings and lists to the steel fabricator for coordination of work.

G. Upon request, submit design calculations sealed by an engineer registered in the state of the project.

1.5 QUALIFICATIONS

A. The manufacturer shall be a member of the Steel Joist Institute.

B. Unless otherwise noted on the drawings or herein specified, the work shall conform to the Standard Specifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Joists and Joist Girders: Conform to the standard specifications and the following:
   1. Special joist and joist girders: Comply with the Standard Specifications and special design criteria as noted on the drawings. Special design criteria may include loading, end moments, wind uplift, deflection limits, maximum widths, special bridging, bottom chord bracing, chord stiffeners, bearing conditions, special seats, special chord configurations, clearance for ducts through members, etc. Provide all accessories required to comply with the Standard Specifications and the design criteria.
   2. Identify each member with its mark.

B. Extended Ends: To comply with the Standard Specification and have a uniform load carrying capacity of the joist unless special design criteria are shown on the drawings.

C. Bridging: Provide manufacturers standard complying with the Standard Specifications and with the following, unless otherwise indicated on the drawings.
   1. K and LH (for spans up to and including 60 feet) series Joists:
      a. Provide standard horizontal bridging complying with the Standard Specifications.
      b. Provide bolted diagonal bridging for erection stability as required by the Standard Specifications, the governing building code or OSHA.
   2. LH (for spans exceeding 60 feet) and DLH series Joists:
      a. Provide bolted diagonal bridging for all rows.
   3. Joist Girders: Provide and install bottom chord bracing as required to prevent the bottom

chord l/r ratio from exceeding the specified criteria in the Standard Specifications. Provide and install additional bottom chord bracing as required by the design of special joist girders with end moments or uplift as indicated on the drawings.

4. Number of rows of bridging shall comply with the Standard Specifications.
5. Where uplift forces due to wind are specified on the drawings and are a controlling factor in the design, provide bridging to comply with the Standard Specifications including a single line of bottom chord bridging near the first bottom chord panel point, at each end of the joist.
6. Where end moments are indicated on the drawings, provide bottom chord bracing at the first bottom chord panel point at each end of the joist.
7. Provide and install special bridging complying with the Standard Specifications as noted on the drawings.
8. Provide and install sag rods complying with Manufacturer's standard as required for erection of joists.
9. Provide positive anchorage at the ends of each bridging row at top and bottom chords.

D. Shop Paint: Manufacturer's Standard - conforming to the performance requirements of the Standard Specifications.

E. Outriggers, Headers, Bottom Chord Struts, Ceiling Extensions and other accessories: Manufacturer's standard complying with the Standard Specifications and any special design criteria shown on the drawings.

F. Design of all members and accessories shall be performed under the direction of an engineer registered in the state of the project.

PART 3 -EXECUTION

3.1 HANDLING AND ERECTION

A. Handling and erection shall be in accordance with Standard Specifications. Protect joists and joist girders and accessories from harmful elements when stored at the job site. Store above the ground on platforms, pallets or other supports. Keep joists and joist girders free of dirt and other foreign matter.

3.2 FIELD REPAIRS

A. Damaged materials will be rejected. The Contractor will be responsible for the repair or replacement of all damaged material. Evaluation and repairs shall conform to the Standard Specifications and the following:
   1. The manufacturer shall be engaged to evaluate the damage and determine if joists may be repaired or must be replaced.
   2. Any evaluation of damaged material that concludes that the material is acceptable for use shall be accompanied by a written certification from the manufacturer that the material conforms with the Standard Specifications. The certification shall be sealed by the manufacturer's engineer.
   3. When repairs are recommended, they shall be designed by the manufacturer. Drawings and/or written instructions for the repairs shall be sealed by the manufacturer's engineer

and submitted to the Architect.

4. After completion of the repair work, the Manufacturer shall inspect the work and provide written documentation that the material has been installed correctly and that the repaired member conforms to the Standard Specifications.

3.3 FIELD QUALITY CONTROL

A. The testing laboratory shall perform the following:
   1. Inspection of Field Welds shall be in accordance with Section 6 of the AWS Building Code as follows:
      a. Perform a visual inspection of all welds at anchorage to the supporting structure in accordance with Article 605.
      b. All welds that fail shall be re-welded and re-tested until they pass.
   2. Inspection of high-strength bolted construction shall be in accordance with Section 9, AISC Specifications for Structural Joints, and as follows:
      a. All high-strength bolted connections shall be visually inspected to ensure that all plies of the connected elements have been brought into snug contact.

END OF SECTION

SECTION 053000

METAL DECKING

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide Metal Decking work as indicated by the Contract Documents and furnish all supplementary items necessary for its proper installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Quality Control – Division 1.

B. Structural Steel Framing – Section 05 10 00.

C. Steel Joist and Joist Girder Framing – Section 05 21 00.

1.3 REFERENCES

A. The work described in this section, unless otherwise noted on the drawings or herein specified shall be governed by the following codes or specifications.
   1. "Specifications for the Design of Cold-Formed Steel Structural Members": -AISI.
   2. "Code for Welding in Building Construction: - American Welding Society. AWS D1.1.
   3. "Basic Design Specifications": - Steel Deck Institute.

B. These specifications shall be supplemented by the requirements of the Local Building Code.

1.4 QUALIFICATIONS

A. Qualifications of welders and welding operators, filler metal, welding techniques and procedures shall be in accordance with AISC specification for the Design, Fabrication and Erection of Structural Steel for Buildings, and AWS Code for Welding in Building Construction.

B. All field welders shall be certified by a testing laboratory employed by the Contractor. Certifications shall be valid during the time of welding in the erection period.

1.5 SUBMITTALS

A. Shop drawings including erection sequences, procedures, diagrams, schedules and complete details shall be submitted to the Architect for review. Any fabrication of material before review of drawings will be at the risk of the contractor.

1.6 STORAGE OF MATERIAL

A. Sheets shall be protected from the elements in transit. When stored at site, they shall be raised off the ground, and be provided with weatherproof covering. The Architect reserves the right to reject any material that has become damaged because of improper storage.

PART 2 PRODUCTS

2.1 METAL DECK MATERIAL

A. Shall be galvanized conforming to the requirements of ASTM A653 with a minimum yield strength of [33 or 80 ksi].

B. Type, gauge, depth and finish shall be as specified on the Drawings.

C. Welding electrodes shall conform to ASTM A233 "Tentative Specifications for Iron and Steel air-Welding Electrodes", and AWS A 5.1.

D. Finish: Field welds shall be touched-up as approved using a prime coat conforming to TT-P-64 1D, Type 1.

E. Accessories: Provide all accessories necessary to complete the entire installation, including cover plates required to cover all gaps where deck units abut or change direction, around columns, and to cover access holes used for welding.

PART 3 EXECUTION

3.1 INSTALLATION

A. Metal deck shall be installed in accordance with the manufacturers recommendations. Refer to drawings for welding and attachment requirements.

3.2 OPENINGS

A. Openings shall be provided where shown on the Drawings, along with any reinforcing required to strengthen the metal deck.
B. Other openings and reinforcing not shown on Drawings, will be made and reinforced by other trades and are subject to Architect's approval.
C. The Architect shall be immediately notified of any openings where supplemental framing is required but is not provided.

3.3 HANGING LOADS

A. Ceilings, mechanical equipment or other loads shall not be hung from metal deck unless shown on the drawings or approved by the Architect. Method of attachment subject to approval.

3.4 FIELD QUALITY CONTROL

A. The testing agency shall visually inspect the welding and screw attachment pattern for conformance to the Contract Documents.

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, specifications and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section. It is the responsibility of the Contractor and all subcontractors to locate information pertaining to required items of work specified or indicated elsewhere in the Contract Documents.

1.2 SUMMARY

A. This Section includes the following:
   1. Exterior load-bearing wall framing.
   2. Interior load-bearing wall framing.
   3. Exterior non-load-bearing curtain-wall framing.
   4. Ceiling joist framing.

   This section does not include non-load bearing interior wall framing, gypsum board assemblies, shaft-wall assemblies, ceiling-suspension assemblies or insulation. Refer to Division 9 for these items.

B. Related Sections include the following:
   1. Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
   2. Division 6 Section "Rough Carpentry" for subflooring, wall sheathing, or roof sheathing using wood-based structural-use panels, particleboard, fibrous-felted board, and foam-plastic sheathing.
   3. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing metal-stud framing and ceiling-suspension assemblies.
   4. Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 DEFINITIONS

A. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of cold-formed framing delivered to the Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

B. Producer: Entity that produces steel sheet coil fabricated into cold-formed members.

1.4 PERFORMANCE REQUIREMENTS

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

1. Design Loads:
   a. Dead Loads: Weights of materials and construction.
   b. Live Loads: See General Notes.
   c. Roof Loads: See General Notes.
   d. Wind Speed and Exposure: See General Notes
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
   b. Headers at Load Bearing Walls: Vertical deflection of 1/360 of the span.
   c. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
   d. Exterior Non-Load-Bearing Curtain-Wall Framing: Horizontal deflection of 1/600 of the wall height.
   g. Ceiling Joist Framing: Total load vertical deflection of 1/360 of the span.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and/or downward movement of 1 inch.

B. Minimum Requirements: In addition to satisfying the strength and stiffness criteria noted above, framing shall meet the following minimum requirements:
   1. Stud Web Depth and Maximum Stud Spacing: Provide studs with web depths as indicated in the drawings and at maximum spacings as indicated herein. Where special conditions require additional strength or stiffness, spacing may be decreased, gage may be increased or both. Stud web depth shall not be increased.
   2. Kickers/Braces: At the Contractor's discretion, and based on sound engineering principals, wall systems may be designed to span floor to floor without the aid of intermediate kickers/braces or may include kickers/braces above the ceiling line to limit the unbraced height of the stud. Design of kicker/brace systems shall comply with the following minimum requirements:
      a. Kickers must not interfere with other building systems and must be located a minimum of 1'-0" above the ceiling line. It will be the Contractor's responsibility to fully coordinate the kicker/brace system with other trades.
      b. All aspects of the kicker/brace system, including connections to the structure, shall be designed by the engineer responsible for the design of the cold-formed framing. The engineer shall take into consideration the flexibility and strength of the primary structural frame and provide reinforcement of the primary building frame where required.
      c. Kicker braces may connect to concrete slabs and concrete slabs on metal deck, but shall not connect to any metal or wood roof decks.
   3. Wall Openings: Engineer is to design framed wall openings that are wider than the stud spacing as follows:
      a. Frame wall openings with not less than two full height jamb studs at openings less

than 4'-0" wide and with not less than three full height jamb studs at openings equal or greater than 4'-0" wide. Where cripple studs are used for header bearing/connection, they shall be in addition to the full height jamb studs.

b. Over all wall openings, provide box headers consisting of double studs with top and bottom tracks. Install a runner track over each header and anchor to header by welding or screws. Provide, space and align jack studs same as full height studs.

c. Below wall openings, install sill tracks or box header/sills as required by design. Sill tracks, if used, shall be a minimum of 16 gage. Anchor sill tracks or headers to jambs with clip angles, gusset plates or welding. Provide, space and align jack studs same as full height studs.

d. Individual elements of built up jambs, box headers and/or sills shall be fastened together to guarantee composite action.

e. Details of attachment, connections between jambs, headers or sills, and connections to structure shall be clearly shown in the Shop Drawings and constructed accordingly.

4. Bridging: Provide bridging in compliance with AISI specifications. Where walls are scheduled not to receive sheathing, provide adequate bridging in compliance with SSMA and AISI standards. Refer to Architectural for locations where sheathing is to be omitted. Indicate bridging requirements on Shop Drawings.

5. Alignment of Framing and Reinforcement of Tracks in Load-Bearing Systems: Align framing or provide track reinforcement to comply with the following minimum requirements:

a. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

b. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

c. Track reinforcement shall be designed by the engineer responsible for the design of cold-formed metal framing regardless of what material the reinforcement consists of.

d. All costs associated with the reinforcement shall be included in the bid.

e. Indicate track reinforcement on the Shop Drawings.

6. Special Conditions: Provide supplemental reinforcement of cold-formed metal framing as required at special conditions. Supplemental reinforcement shall be designed by the engineer responsible for cold-formed metal framing regardless of what material the reinforcement consists of. All costs associated with the supplemental reinforcement shall be included in the bid. Indicate supplemental reinforcement on the Shop Drawings.

7. Design exterior non-load-bearing curtain-wall framing to limit horizontal deflection without regard for contribution of sheathing materials.

1.5 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining Work.

1. Submittals shall include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
   1. Expansion anchors.
   2. Power-actuated anchors.
   3. Mechanical fasteners.
   4. Vertical deflection clips.
   5. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: Evidence of cold-formed metal framing's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

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

B. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data. This engineer will be responsible for all aspects of the lightgage design of all elements including but not limited to: headers, jack studs, king studs, beams, posts, tracks, supplemental reinforcement, strap bracing, accessories, fasteners, and connections to the primary structure.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing specialty engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance

Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 DELIVERY, STORAGE, AND HANDLING

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

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

1.8 BASIS FOR BIDS

A. Bidders shall perform sufficient engineering design prior to submitting bid to insure that the bid include all costs associated with cold-formed metal framing as indicated in the construction documents. It is the bidders responsibility to review all the construction documents to locate pertinent information regarding the Work and its coordination with other trades.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: The manufacturer shall be a current member of the Steel Stud Manufacturers Association (SSMA).

B. Products: All members, accessories and components shall be as specified in “Product Technical Information” as published by the Steel Stud Manufacturers Association and in compliance with ICBO ER 4943-P.

C. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members” for calculating structural characteristics of cold-formed metal framing.

D. Product Identification: Each stud/joist/rafter shall be identified using SSMA nomenclature for depth, style, flange width and material thickness and with the manufacturer’s name, yield strength (if over 33 ksi), minimum base metal thickness, and the ICBO ES report number embossed or stamped on the web of each section at a maximum of 48 inches on center per ICBO ER 4943P requirements

2.2 MATERIALS

A. Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: 33 for minimum uncoated steel thickness of 0.0428 inch (18 gage) and less; 50,

Class 1 or 3 for minimum uncoated steel thickness of 0.0538 inch (16 gage) and greater.

2. Coating: G90 for all elements in an exterior wall system that backs up masonry. Provide G60 coating for all other conditions.

2.4 NON-LOAD-BEARING CURTAIN-WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
   1. Minimum Uncoated-Steel Thickness: 0.0428 inch (18 gage**)**.
   2. Minimum Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, complying with ASTM C 955, and as follows:
   1. Minimum Uncoated-Steel Thickness: Matching steel studs.
   2. Minimum Flange Width: 1-1/4 inches.

C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:
   1. Minimum Uncoated-Steel Thickness: 0.0538 inch (16 gage).
   2. Flange Width: Appropriately size flange width to accommodate an upward or downward vertical deflection in the primary structure of 1inch.

D. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads, and as follows:
      a. Minimum Uncoated-Steel Thickness: 0.0538 inch (16 gage).
      b. Flange Width: Appropriately size flange width, fully coordinated with inner track and fasteners, to accommodate and upward or downward vertical deflection in the primary structure of 1inch.
   2. Inner Track: Of web depth indicated, and as follows:
      a. Minimum Uncoated-Steel Thickness: 0.0538 inch (16 gage).
      b. Flange Width: Appropriately size flange width, fully coordinated with outer track and fasteners, to accommodate and upward or downward vertical deflection in the primary structure of 1inch.

E. Vertical Deflection Clips: Provide bypass or head clips, as required by framing conditions, complete with special hardware, connectors, tracks, etc., capable of accommodating upward and downward vertical displacement of the primary structure of 1 inch.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.

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

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. End clips.
5. Foundation clips.
6. Gusset plates.
7. Stud kickers, knee braces, and girts.
8. Joist hangers and end closures.
9. Hole reinforcing plates.
10. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

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

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

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

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

E. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

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

2.8 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

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

C. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

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

B. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

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

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

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

H. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

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

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 NON-LOAD-BEARING CURTAIN-WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated in shop drawings.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: 16 inches maximum and as indicated in the shop drawings. Where special conditions require additional strength or stiffness, stud spacing may be decreased, gage may be increased or both. Stud size shall not be increased.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements. At nonplumb conditions, miter cut studs and provide special tracks to insure that stud webs are uniformly seated against the track and that track legs adequately lap the stud flanges.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support. Provide one of the following connection types as indicated in Shop Drawings:
   1. For in-fill curtain wall applications, install single deep-leg deflection tracks or vertical deflection head clips and anchor to building structure when the wall is to be stick built.
   2. For in-fill curtain wall applications, install double deep-leg deflection tracks and anchor outer track to building structure when the wall is to be installed in panels.
   3. For bypass curtain wall applications, connect vertical deflection clips to bypassing studs and anchor to primary building structure.

E. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings and as follows. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated in Shop Drawings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates. Provide multiple stud jambs, cripple studs, runner tracks, sill tracks, jack studs and connectors as indicated in the Shop Drawings.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
   1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

3.5 FIELD QUALITY CONTROL

A. Field Inspection by Contractor: The Contractor shall provide effective, full time quality control over all fabrication and erection. The Contractor shall inspect the completed work for conformance to the Shop Drawings and make any necessary repairs or modifications to bring the Work into compliance.

B. Inspection and Testing: Owner will engage a qualified independent testing agency to perform field quality control inspection and testing as follows:
   1. Members, built up members, bridging, kickers/braces, headers, jambs, reinforcement and supplemental reinforcement shall be visually inspected for size, gage, spacing, alignment, configuration and placement.
   2. Connections between members and connections to structure shall be inspected as follows:
      a. Field and shop welds shall be visually inspected for conformance to the Shop Drawings and AWS standards.
      b. Screws, power actuated nails and other fasteners shall be visually inspected for type, size, number, placement and installation.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace Work that does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed cold-formed metal framing. Paint surfaces with galvanizing repair paint.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Applications requiring miscellaneous metal fabrications.

B. Principal Products:
   1. Lintels and ledge angles.
   2. Elevator fabrications.
   3. Ladders.
   4. Miscellaneous structural supports.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Manufactured ladders.

B. Shop Drawings: Layouts, details, connections, anchorages.
   1. Elevator hoist beams.
   2. Miscellaneous steel supports and framing.
   3. Ladders and safety devices.
   4. Steel lintels.
   5. Steel ledge angles.

1.4 INFORMATIONAL SUBMITTALS

A. Delegated Design Submittals: Ladders and Elevator beams.

B. Research Evaluation Reports: Post-installed anchor ICC-ES reports.

C. Qualification Statements: Welders certificate.

1.5 QUALITY ASSURANCE

A. Welding Qualifications:
   1. Steel Fabrications: AWS D1.1.
   2. Aluminum Fabrications: AWS D1.2.
   3. Stainless Steel Fabrications: AWS D1.6.

B. Mockups and Field Samples: Metal fabrications for mockup and field samples assemblies specified in other Sections.

1.6 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 LINTELS AND LEDGE ANGLES

A. Loose Steel Lintels: Steel sections, size and configuration shown on Drawings, length for minimum 8 inch bearing both sides of opening.

B. Ledge Angles: Steel sections, size and configuration shown on Drawings; shop-drilled fastener holes. Fabricate for 1/4 inch gap between units.

C. Built-Up Lintel Assemblies: Steel structural sections and plate shown on Drawings.

D. Finishes:
   1. Exterior Walls: Galvanized.
   2. Interior Walls: Shop primer.

2.2 CONCEALED LINTEL SYSTEM FOR BRICK ARCH

A. Engineered concealed arch Lintel: Manufactured steel system for concealed brick support.
   1. Manufacturer and product:
      a. Hohmann & Barnard; Concealed Lintel Systems, as Basis of Design.
      b. Or approved equal.
   2. Masonry Anchor Product: Hot rolled carbon steel with hot dip galvanized finish.
   3. Configuration: See Drawings.
   4. Arch Size: See Drawings.

2.3 ELEVATOR FABRICATIONS

A. Coordinate elevator fabrications with elevator manufacturer requirements. See Section

142100.

B. Sill Angles: Steel sections shown on Drawings for support of elevator sills.
   1. Finish: Shop primer.

C. Hoist Beams: Steel wide flange sections, shape and size required to support applied loads.
   1. Deflection: L/240, maximum.
   2. Finish: Shop primer.

D. Elevator Sump Covers:
   1. Welded or pressure-locked gratings with maximum 1/2 inch space between bearing bars; galvanized finish.
   2. Cover Supports: Steel angle frames with anchors for fastening to concrete; galvanized finish.

2.4 LADDERS

A. Contractor Option: Manufactured or shop-fabricated ladders.

B. Elevator Pit Ladders: ASME A17/CSA B44.

C. Manufactured Ladders: Steel OSHA 1926.1053.
   1. Manufacturers:
      a. O'Keefe's.
      b. Alaco Ladder.
      c. Cotterman.
      d. EGA Products.
      e. Platforms & Ladders.
      f. Precision Ladders.
   2. Side Rails: Steel plates.
   3. Rungs: 1 inch steel bars, non-slip, spaced 12 inches on center.
   4. Steel Finish: Shop primer.

D. Fabricated Vertical Ladders: ANSI ASC A14.3, steel welded construction. Provide bottom and wall attachment angles spaced maximum 60 inches on center.
   1. Side Rails: 3/8 by 2 inches spaced 18 inches apart.
   2. Rungs: One inch non-slip steel bars let into side rails and spaced 12 inches on center.
   3. Exterior Ladders: Zinc rich primer.
   4. Interior Ladders: Shop primer.

2.5 MISCELLANEOUS STRUCTURAL SUPPORTS

A. Miscellaneous Structural Supports: Delegate design to licensed fabricator Professional Engineer.
   1. Supports fabricated from structural steel shapes coordinated with supported item manufacturer anchorage requirements and building structure.
   2. Limit lateral movement and deflection to manufacturer tolerances.

3. Manufacturers:
   a. Halfen.
   b. Hilti.
   c. Unistrut.
4. Other Supports: Structural steel sections shown on Drawings.
   a. Finish: Shop primer.

2.6 INSTALLATION ACCESSORIES

A. Concrete Embedment Insert: Wedge type for adjustable bolt location; ASTM A47 malleable iron or cast steel, galvanized per ASTM A153. Supply bolts, washers, and shims with ASTM F2329 hot-dip galvanized finish.

B. Concrete Fill: 3,000 psi concrete; see Section 033000.

C. Post-Installed Anchors: Torque-controlled expansion anchors.
   1. Material: Stainless steel.

D. Shop Primer: See Section 099000.

E. Zinc-Rich Primer: SSPC Paint 20, Type I Inorganic.

F. Separation Coating: Bituminous paint; SSPC-Paint 12.

G. Grout: ASTM C1107, factory-packaged nonmetallic, shrinkage resistant interior use grout.

2.7 PERFORMANCE

A. Delegated Design:
   1. Delegate design to manufacturer or fabricator licensed Professional Engineer.
      a. Elevator hoist beams.
      b. Beam and plate lintels.
      c. Guard rails.
      d. Ladders.
      e. Miscellaneous steel supports and framing.
   2. Structural Design Criteria: See Structural Drawings.
   3. Structural Loads: See Structural Drawings.
   4. Seismic Design Criteria: See Structural Drawings.

B. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.8 MATERIALS - STEEL

A. Steel Structural Wide Flange Shapes: ASTM A992.

B. Steel Hollow Structural Sections: ASTM A500, Grade C.

C. Other Steel Structural Shapes: ASTM A36.

D. Steel Plates: ASTM A36 or A572, Grade 50.

E. Steel Pipe: ASTM A53, Grade B.

F. Steel Sheet: ASTM A653, Grade 33 Structural Quality, G60 galvanizing.

G. Steel Bolts: ASTM F3125, Type 1, Grade A325, heavy hex style.
   1. Finish: Hot-dip galvanized.

H. Steel Nuts: ASTM A563, types appropriate for bolts.
   1. Finish: Hot-dip galvanized.

I. Welding Materials: AWS D1.1, types as required for materials being welded.

2.9 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to uniform small radius.

E. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 2.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Tolerances:
   1. Squareness: 1/8 inch maximum difference in diagonal measurements.
   2. Face Offset: 1/16 inch, maximum.
   3. Misalignment of Adjacent Members: 1/16 inch, maximum.
   4. Bow: 1/8 inch in 48 inches, maximum.
   5. Plane: 1/8 inch deviation in 48 inches, maximum.

2.10 STEEL FINISHES

A. Prepare surfaces to be primed per SSPC SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter before finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime paint items in fabrication shop with two coats except where galvanizing is specified.

E. Galvanizing: ASTM A123; hot-dip galvanize after fabrication.

F. Galvanizing for Fasteners, Connectors, and Anchors:
   1. Hot-Dip Galvanizing: ASTM A153.
   2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.11 STAINLESS STEEL FINISHES

A. Stainless Steel: NAAMM AMP 503, No. 4 satin directional polish.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates for items required to be cast into concrete and embedded in masonry.

C. Apply separation coating to aluminum surfaces contacting dissimilar metals, concrete, and masonry.

3.2 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Separate dissimilar exterior metals with non-absorptive gaskets.

C. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

D. Fasten Work rigidly and securely to supports.

E. Field weld components shown on Drawings or shown on Shop Drawings.
   1. Steel: AWS D1.1.
   2. Aluminum: AWS D1.2.

3. Sheet Steel: AWS D1.3.
4. Stainless Steel: AWS D1.6.

F. Obtain Architect approval before site cutting or making unanticipated adjustments.

G. After erection, touch up welds, abrasions, and damaged finishes with prime paint or zinc-rich paint to match shop finishes.

H. Miscellaneous Framing and Supports:
1. Attach supports rigidly and securely to building structural elements.
2. Brace overhead support framing to prevent movement of supported items.

3.3 INSTALLATION TOLERANCES

A. Plumb: 1/4 inch deviation maximum, either per story or every 12 ft in height, whichever is greater; non-cumulative.

B. Alignment: 1/8 inch offset deviation, maximum.

C. Position: 1/4 inch deviation, maximum.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
1. Failed Test Retest Cost: Contractor responsibility.

B. Field Weld Inspection:
1. Steel: AWS D1.1.
2. Aluminum: AWS D1.2.
3. Sheet Steel: AWS D1.3.
4. Stainless Steel: AWS D1.6.

C. Non-Conforming Work: Make corrections or replace, and retest.

END OF SECTION

SECTION 055100

METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Exit Stars.

B. Principal Products:
1. Metal stair stringers, risers, and framing.
2. Metal pan treads, risers, and platforms.
3. Precast concrete treads.
4. Installation accessories.

C. Related Requirements.
1. Section 033000: Cast in place concrete.
2. Section 055000: Metal fabrications.
3. Section 055213: Pipe and tube railing .
4. Section 057500: Decorative formed metal.
5. Section 057300: Decorative metal railings.
6. Section 099000: Painting and coatings.
7. Section 099733: Concrete floor sealer.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate metal stair support and anchorage installation.
2. Coordinate concealed wall-mounted handrail support locations.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one month, minimum, before starting Work of this Section.
2. Additional Attendees: Structural supports installers, enclosing walls installers.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Steel stair system.
2. Handrail brackets.
3. Abrasive nosings.
4. Factory-filled concrete treads.

5. Precast concrete treads.
6. Concrete tread slip-resistant aggregate.
7. Shop primer.

B. Shop Drawings:
1. Plans, elevations, sections, details, and attachments, including hanger supports inside enclosing walls.
2. Railing layout, profiles and sizes, connections, and anchorage details.
3. Block-out locations for concrete and masonry.
4. Magnitudes and locations of loads imposed on building structure.

C. Samples:
1. Abrasive nosings.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
1. Paint compatibility.

B. Delegated Design Submittals:
1. Stairs.
2. Handrails, guards, and infill.

C. Test and Evaluation Reports: Independent testing agency test results showing:
1. Code compliance of post installed anchors.

D. Field Quality Control Submittals: Field test and inspection reports.

E. Manufacturer Reports: Field test and inspection reports.

F. Qualification Statements: Professional engineer and welder.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer: Stair fabricator.
2. Licensed Professionals: Engineer e xperienced in designing metal stairs and railings, licensed in Florida.
3. Welding:
a. Steel Members: AWS D1.1.
b. Sheet Steel: AWS D1.3.
c. Stainless Steel: AWS D1.6.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store products off ground and protected from water.
   2. Handle products to prevent impact damage.

1.7 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Photoluminescent Nosings: Maintain emitting glow with less than 5 percent light loss.
   2. Warranty Period: 25 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Alfab.
   2. American Stair.
   3. Breuer Metal Craftsmen.
   4. Duvinage Sharon Stairs.
   5. Lapeyre Stair.
   6. Pacific Stair.

2.2 STAIRS - GENERAL

A. Handrail Continuity: Gripping surfaces uninterrupted by newel posts, other structural elements or obstructions.

B. Headroom: Size beams and other supports to maintain minimum 80 inch clearance.

C. Uniformity of Risers and Treads: Fabricate treads and risers to uniform dimensions between floors.

D. Guard Infill Design: Openings prohibit 4 inch diameter sphere passage.

2.3 TREADS AND LANDINGS

A. Concrete: Normal weight ready-mixed concrete, 3,000 psi minimum 28 day compressive strength; 1/2 inch maximum aggregate size; see Section 033000.
   1. Reinforcement: ASTM A1064, galvanized welded wire reinforcement, 2 by 2 inch size, 0.062 inch diameter wire.

B. Precast Concrete Treads: Factory cast in tread pans.
   1. Surface: Steel troweled smooth.
   2. Seal concrete per Section 099733 "Concrete Floor Sealer".

2.4 STEEL RAILINGS

A. Comply with applicable requirements in Section 055213 for tube railings and Section 057300 for decorative glazed railings.
   1. Connect posts to stair framing by direct welding unless otherwise indicated.

2.5 INSTALLATION ACCESSORIES

A. Anchor Bolts: ASTM F1554, Grade 36.
   1. Finish: Hot-dip galvanized for interior stairs.

B. Post-Installed Anchors: Torque-controlled expansion anchors.
   1. Interior: Zinc plated per ASTM B633 or ASTM F1941, Class FE.

C. Structural Connection Bolts: ASTM F3125, Grade A325, heavy hex, structural type with ASTM A563, Grade DH nuts.
   1. Finish: Hot-dip galvanized for interior stairs.

D. Connection Bolts: ASTM A307, Grade A hexagon head bolts with ASTM A563 nuts.
   1. Finish: Hot-dip galvanized for interior stairs.

E. Grout: ASTM C1107; factory packaged nonmetallic, shrinkage resistant grout for interior use.

F. Stair Tread Adhesive: Polyurethane or ASTM C881 two-part epoxy structural adhesive, non-sag, paste consistency.

G. Concrete Anchors: Galvanized steel expansion anchors, sized per manufacturer recommendations.

H. Hollow Masonry Anchors: Two-part spring wing toggle bolts, galvanized carbon steel, minimum 1/4 inch diameter.

2.6 PERFORMANCE

A. Delegated Design:
   1. Delegate stair design to licensed fabricator Professional Engineer.
   2. Structural Design Criteria:
      a. Stair Live Loads: 100 psf uniform, 300 pound concentrated, non-simultaneous.
      b. Handrail and Guard Structural Loads:
         1) Handrail: 50 plf and 200 pound concentrated, both omnidirectional and non-simultaneous.
         2) Guard Infill: 50 pounds concentrated.
      c. Stair Allowable Deflection: of span, maximum.
      d. Railing Allowable Deflection: 1/60 of height, maximum.
   3. Seismic Movement: ASCE/SEI 7.
   4. Structural Movement: See Structural Drawings.

B. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.7 METAL MATERIALS

A. Exposed Surfaces: Prevent seam marks, rolled names, and other irregularities.

B. Steel Plates, Shapes, Bars: ASTM A36.

C. Steel Sheet: ASTM A1011 hot-rolled, structural steel, Grade 33 minimum.
   1. Galvanized Steel Sheet: ASTM A653 G90 coating.

D. Structural Steel Tubing: ASTM A500, Grade C.

E. Steel Tubing for Handrails: ASTM A513.

F. Stainless Steel Tubing: ASTM A554, Grade MT304.

2.8 FABRICATION - STAIRS

A. Stair Classification: NAAMM publication AMP 510, Commercial.

B. Factory Assembly: Assemble components to minimize field assembly.

C. Remove sharp or rough areas on surfaces exposed to view or to human contact.

D. Exposed Welded Connections: Weld continuously and grind to NOMMA Finish No. 2 appearance.

E. Bolted Connections: Flush, full contact.

F. Provide clips for mounting framing specified in Section 092116 for gypsum board soffits on

flights and landings.

G. Stringers: Channel or Plate. Close exposed ends of channels with welded steel plate.
   1. Bolted Joints: Not exposed on finish surfaces.

H. Hanger Rods: Stairs enclosed by gypsum board or shaft wall assemblies.

I. Temporary Struts: Design stairs with temporary struts and stability bracing where erected before enclosing walls are constructed.

J. Metal Pan Stairs: Commercial Class.
   1. Metal Pans: Galvanized Steel sheet; 0.067 inch minimum thickness.
   2. Attachment: See Drawings.
   3. Metal Soffits: Even, level surface at landings.
   4. Finish: Factory primed.

K. Fabrication Tolerances:
   1. Riser Heights and Tread Depths: Fabricate within tolerance required by building code governing Project.

2.9 FABRICATION - RAILINGS

A. See Sections 055213 and 057300.

2.10 FINISHES

A. Primer Materials:
   1. Shop Primer: SSPC Paint 15, Type 1, red oxide.
   2. High Performance: Section 099600.

B. Primer Application: Apply primer to all surfaces except those to be field welded or embedded in concrete and masonry.
   1. Apply second coat to surfaces that will be concealed when installed, and to bolts and welds.

C. Galvanizing: ASTM A153 and ASTM A123, as applicable.
   1. Fill drain and vent holes not intended as weeps and file to eliminate sharp edges.

D. Galvanizing Repair Paint: Zinc-rich; ASTM A780.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that supports are installed and ready to receive stair components.

B. Verify locations of concealed supports in gypsum board assemblies for wall-mounted handrail brackets.

3.2 PREPARATION

A. Strip surfaces for field welding to bare metal and remove contaminating substances.

3.3 INSTALLATION - STAIRS

A. Install assemblies plumb and level, accurately fitted, and free from distortion and other defects.

B. Connect stairs to supporting structure using brackets, fasteners, and other anchorage devices. Transfer design loads to structure.

C. Temporary Bracing and Supports: Maintain alignment and support erection loads until final connections to structure are made.

D. Field weld components shown on Shop Drawings.
   1. Steel: AWS D1.1.
   2. Sheet Steel: AWS D1.3.
   3. Stainless Steel: AWS D1.6.

E. Grind exposed welds to NOMMA Finish No. 2. Match contours of adjoining surfaces and make seamless appearance.

F. Make mechanical connections with full-contact surfaces, accurately aligned, rigid, and securely fastened.

G. Obtain prior permission of Architect for site cutting or modifications not shown on final Shop Drawings.

H. Grouted Baseplates:
   1. Clean and roughen bearing surfaces.
   2. Set baseplates on shims or leveling nuts.
   3. Fill space with grout to provide full bearing. Finish exposed edges flush and aligned with bearing plates.

I. Place and finish concrete fill treads and landings per Section 033000.

J. Abrasive Nosings: Anchor in proper alignment with edges of treads and landings.

K. Install precast concrete stair treads with permanent adhesive.

3.4 INSTALLATION - RAILINGS

A. See Sections 055213 and 057300.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Testing: ASTM E894 and ASTM E935 on randomly selected representative railing assemblies.

C. Field Weld Inspection:
   1. Steel: AWS D1.1.
   2. Aluminum: AWS D1.2.
   3. Sheet Steel: AWS D1.3.
   4. Stainless Steel: AWS D1.6.

D. Non-Conforming Work: Remove and replace, and retest.

3.6 REPAIR

A. Apply primer to field welds, bolted connections, and damaged areas of factory-applied primer.

B. Apply galvanizing repair paint per ASTM A780 to field welds, bolted connections, and damaged areas of hot-dip galvanized members.

C. Remove scratches and abrasions from stainless steel surfaces by polishing to match factory finish.

3.7 CLEANING

A. Clean primed steel surfaces; remove substances capable of impairing finish paint bond.

B. Remove stains.

C. Clean surfaces; remove substances capable of impairing resilient stair accessory adhesive bond.

3.8 PROTECTION

A. Protect stairs used during construction period against soiling and damage.

END OF SECTION

SECTION 055133

METAL LADDERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Manufactured fixed metal ladders including:
a. Standard fixed roof access ladders with parapet platforms.
b. Ladders with safety systems.
2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation, whether or not such items are included in the Specifications or indicated on the Drawings.

B. Related Requirements:
1. Section 055000 Metal Fabrications for Elevator pit ladders.

1.2 SUBMITTALS

A. Action Submittals:
1. Product Data: For each type of product; include installation instructions.
2. Shop Drawings:
a. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of ladders and their connections.
b. Provide templates for anchors and bolts specified for installation under other specification Sections.
c. Provide reaction loads for each hanger and bracket.

B. Closeout Submittals:
1. Vertical Climbing Harness: Deliver to Owner.

1.3 QUALITY ASSURANCE

A. 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.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage. Store products in

manufacturer's unopened packaging until ready for installation. Protect all components off the ground, away from standing water on a hard, level surface.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Product design shall comply with OSHA 1910.23 minimum standards for ladders.

B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3, except for elevator pit ladders.
   1. Elevator Pit Ladders: Comply with ASME A17.1/CSA B44.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with the Contract Documents, provide products by one of the following, unless otherwise indicated.
   1. Kattsafe.
   2. O'Keeffe's, Inc.
   3. Precision Ladders.
   4. Vestil Manufacturing Corp.

2.3 ROOF LADDERS

A. Angled Fixed Ladder with Parapet Platform:
   1. Product "KC103 Crossover Bridge System" manufactured by Kattsafe.
   2. Material: High tensile 6106-T6 aluminum.
   3. Dimensions: See Drawings.
   4. Weight: 6.4 pounds per 40-inch section.
   5. Base Plate: "No. LD419F" non-penetrating aluminum base plate.

B. Standard Fixed Ladder with Parapet Platform:
   1. Product: "Model RL32" manufactured by Kattsafe.
   2. Material: High tensile 6106-T6 aluminum.
   3. Dimensions:
   4. Weight: 6.4 pounds per 40-inch section.
   5. Base Plate: "No. LD419F" non-penetrating aluminum base plate.
   6. Provide minimum 72-inch-high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

C. Standard Fixed Ladder:
   1. Product: "Model RL34" manufactured by Kattsafe.
   2. Material: High tensile 6106-T6 aluminum.
   3. Dimensions: See Drawings.

4. Weight: 6.4 pounds per 40-inch section.
5. Base Plate: “No. LD419F” non-penetrating aluminum base plate.

2.4 LADDER SAFETY SYSTEM

A. Description: OSHA compliant self-retracting lifeline system attached to a fixed ladder consisting of a carrier, safety sleeve, lanyard, connectors, and body harness; provide for ladders with 22 foot or greater climb length.
   1. Products: Provide ladder manufacturer’s standard cable or rigid rail system where indicated.
   2. Body Harness: Owner-provided.

2.5 FINISHES

A. Aluminum: Provide mill finish.

2.6 FABRICATED LADDERS, ALTERNATE

A. As an alternate, steel ladders designed and fabricated in conformance with the requirements of Section 05 50 00 Metal Fabrications may be provided in lieu of the specified manufactured metal ladders.

PART 3 EXECUTION

3.1 EXAMINATION

A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.

B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 055213

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Interior painted steel railing at exit stairs.

B. Principal Products:
   1. Painted steel railings.

C. Related Requirements.
   1. Section 055100 Metal Stairs: For stairs and landings referenced to railings and guardrails of this Section.
   2. Section 099600:High-Performance Coating Painting.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Railing system components.
   2. Handrail brackets.
   3. Shop primer.
   4. Prefinished Components: Initial selection color charts and Samples.

B. Shop Drawings:
   1. Railing layout, profiles and sizes, and anchorage details.
   2. Railing connections.
   3. Anchorage accessories and fasteners.

C. Samples:
   1. Railings: 12 inches long, shop-finished Sample.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Mill Certificates: Type 316 stainless steel.

B. Delegated Design Submittals:
   1. Guards and infill.
   2. Handrails.

C. Test and Evaluation Reports: Independent testing agency test results showing:
   1. Code compliance of post-installed anchors.

D. Field Quality Control Submittals: Field test and inspection reports.

E. Qualification Statements: fabricator and installer.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Licensed Professionals: Engineer experienced in designing railings, licensed in Tennessee.
   2. Welding:
      a. Steel Members: AWS D1.1.
      b. Stainless Steel: AWS D1.6.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store products off ground and protected from water.
   2. Handle products to prevent impact damage.

1.7 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 STEEL RAILINGS, INTERIOR

A. Steel Tube Railings: ASTM A513.
   1. Rails: 1-1/4 inch and 1-1/2 inch outside diameter and square.
   2. Posts: 1-1/2 inch outside diameter.

B. Wall Brackets: Concealed fastener design.
   1. Material and Finish: Same as railing.
   2. Clearance: 1-1/2 inch gap between handrail and wall surface.

C. Railing Infill:
   1. Steel Square Bars: See Drawings for size and arrangement.

D. Materials:
   1. Bars, Plates, and Shapes: ASTM A36.
   2. Cast Iron: ASTM A48.
   3. Exposed Fasteners: Hot-dip galvanized steel, flush countersunk screws or bolts; consistent with railing design.
   4. Anchors: Hot-dip galvanized steel; selected to meet structural performance requirements and substrate conditions.
   5. Splice Connectors: Hot-dip galvanized steel, concealed spigots.

E. Galvanizing: ASTM A123; hot-dip after fabrication.

F. Galvanized Steel Finishes: Shop primed.
   1. Color: Architect selected.

2.2 INSTALLATION ACCESSORIES

A. Welding Rods and Bare Electrodes: Selected per AWS for metal being welded and structural requirements.

B. Bituminous Paint: ASTM D1187 asphalt emulsion.

C. Grout: ASTM C1107, factory-packaged nonmetallic, shrinkage resistant interior use grout.

D. Embedded Sleeves: Stainless steel tubes; sized to fit posts, 6 inches long, minimum, with closed bottoms.

2.3 PERFORMANCE

A. Delegated Design:
   1. Delegate railing design to fabricator licensed Professional Engineer.
   2. Structural Loads:
      a. Handrail and Top of Guard: 50 plf and 200 pounds concentrated, both omnidirectional and non-simultaneous.
      b. Guard Infill: 50 pounds concentrated.
   3. Structural Design Criteria: See Structural Drawings.
   4. Allowable Deflection: 1/360 of unsupported height, maximum.

B. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

C. Handrail Continuity: Gripping surfaces uninterrupted by newel posts, structural elements, or obstructions.

D. Guard Infill Design: Openings prevent 4 inch diameter sphere passage.

2.4 FABRICATION

A. Accurately form components to suit stairs and landings, to each other, and to building structure.

B. Accommodate expansion and contraction of members and building movement without damage to member connections.

C. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as railing assembly.

F. Railing Joints and Connections:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 2.

G. Changes in Direction:
   1. Uniform, without buckling, twisting, deforming or cracking surfaces.
   2. Formed by flush bending or with prefabricated elbow fittings.
   3. Radii: See Drawings.

H. Railing Ends: Closed, except when railing returns to within 1/4 inch of wall face.

I. Removable Railing Fittings: Stainless steel slip-fit sockets sized for a close fit with posts. Include socket covers designed and fabricated to resist being dislodged.

J. Factory Assembly: Fit and shop assemble components in largest practical sizes for delivery to site.

2.5 STEEL FINISHES

A. Shop-Primed, Field-Painted Railings:
   1. Primer Materials: Section 099000.
   2. Galvanized Railings: Fill drain and vent holes not intended as weeps and file smooth.

3. Galvanizing Repair Paint: Zinc-rich paint; ASTM A780.
4. Preparation for Priming:
   a. Uncoated Steel: SSPC SP-6/NACE No. 3, Commercial Blast Cleaning.
   b. Galvanized Steel: Thoroughly clean and treat railings with etching cleaner.
5. Primer Application: SSPC PA-1. Apply primer to all surfaces except those to be field welded or embedded in concrete and masonry.
   a. Apply second coat to surfaces that will be concealed when installed, and to bolts and welds.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates for items required to be cast into concrete, embedded in masonry, and placed in partitions.

C. Apply separation coating to aluminum surfaces contacting dissimilar metals, concrete, and masonry.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortions or defects.

B. Field weld components shown on Shop Drawings.
   1. Steel: AWS D1.1.
   2. Aluminum: AWS D1.2.
   3. Sheet Steel: AWS D1.3.
   4. Stainless Steel: AWS D1.6.

C. Anchor Posts to Structure:
   1. Posts: Preset sleeves in concrete; set posts in sleeves and fill space around posts with grout.
   2. Posts: Core drill concrete; set posts in cored holes and fill space around posts with grout.

D. Attach Railings:
   1. Wall Mounting: Mount with wall brackets and end flanges.
   2. Guardrail Mounting: Weld railing brackets to posts.

E. Field weld anchors as shown on Shop Drawings. Grind welds smooth. Touch up welds with primer.

F. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

G. Install railing gates plumb and level. Adjust hardware for smooth, accurate operation.

H. Install vertical clearance railing plumb, level, and aligned with edges of stair members lower than 80 inches above floor.
   1. Applications at existing concrete slabs (Building 1, Basement Level: Secure post base plates with screws in expansion shields.
   2. RevisedREvieApplications at new concrete slabs: Secure posts in embedded sleeves with anchorage cement.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Testing: ASTM E894 and ASTM E935 on randomly selected representative railing assemblies.

C. Field Weld Inspection:
   1. Steel: AWS D1.1.
   2. Aluminum: AWS D1.2.
   3. Sheet Steel: AWS D1.3.
   4. Stainless Steel: AWS D1.6.

D. Non-Conforming Work: Remove and replace, and retest.

3.5 CLEANING

A. Clean with soap and clean water.

B. Primed Steel: Remove substances that may impair finish paint bond.

3.6 REPAIR

A. Apply primer to field welds, bolted connections, and damaged areas of factory applied primer.

B. Apply galvanizing repair paint per ASTM A780 to field welds, bolted connections, and damaged areas of hot-dip galvanized members.

C. Remove scratches and abrasions from stainless steel surfaces by polishing to match factory

finish.

3.7 PROTECTION

A. Protect railings during construction period against soiling and damage.

END OF SECTION

SECTION 061053

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Wood blocking and nailers.

B. Principal Products:
   1. Lumber.
   2. Plywood.
   3. Fire Retardant.
   4. Wood preservative.
   5. Installation materials.

C. Principal Products:
   1. Lumber for blocking and nailers.
   2. Wood panels for blocking and backboards.
   3. Fire retardant treatment.
   4. Wood preservative treatment.

1.2 ACTION SUBMITTALS

A. Product Data: Rough carpentry materials.
   1. Fire retardant treatment.
   2. Wood preservative treatment.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store lumber indoors, protected from elements.
   2. Store lumber elevated above grade, protected from moisture.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber: DOC PS 20, grading rules certified by ALSC Board of Review.
   1. Maximum Moisture Content: 19 percent.

B. Plywood: DOC PS 1, Exterior A-C.
   1. Thickness:.

2.2 FIRE RETARDANT TREATMENT

A. Fire Retardant by Pressure Process:
   1. Exterior Type: ASTM D2898.
   2. Interior Type A: ASTM D3201, 28 percent maximum moisture content at 92 percent relative humidity.
   3. Surface Burning Characteristics per.
      a. Flame Spread: 25, maximum.
      b. Smoke Developed:, maximum.
   4. Labeling: Per IBC requirements.
   5. Kiln dry after treatment.
      a. Lumber: 19 percent maximum moisture content.
      b. Plywood: 15 percent maximum moisture content.
   6. Applications:
      a. Concealed blocking.
      b. Plywood utility backing panels.
      c. See Drawings.

2.3 WOOD PRESERVATIVE TREATMENT

A. Wood Preservative, Pressure Treatment: AWPA U1.
   1. Kiln dry after treatment.
      a. Lumber: 19 percent maximum moisture content.
      b. Plywood: 15 percent maximum moisture content.
   2. Labeling: Per IBC requirements.
   3. Applications:
      a. Roofing and Exterior Wall Assemblies: Wood; Category UC2.
      b. Adjacent: Wood; Category UC3b.
      c. See Drawings.

2.4 INSTALLATION ACCESSORIES

A. Fasteners and Anchors: See Drawings for types, sizes, and spacing.
   1. General: Follow requirements for wood member size and type.
      a. Preservative Treated Wood: Type 304 stainless steel.

b. Other Applications: ASTM A153 hot-dip galvanized.
2. Nails, Brads, and Staples: ASTM F1667.
3. Power-Driven Fasteners: NES NER-272.
4. Wood Screws: ASME B18.6.1.
5. Screws for Metal Framing:
   a. Cold-Formed Metal Framing: ASTM C954.
   b. Other Metal Framing: ASTM C1002.
6. Anchors:.

B. Flexible Flashing: flashing sheet membrane.
1. Application: Separation layer between preservative-treated wood and metal decking.

PART 3 EXECUTION

3.1 INSTALLATION

A. Set members level and plumb, in correct positions.

B. Place horizontal members crown side up.

C. Construct curb members of solid wood sections.

D. Space on center.

E. Curb roof openings. Form corners by alternating lapping side members.

F. Coordinate curb installation with installation of.

G. Follow ANSI/SPRI ED-1 for fastening roof edge blocking.

H. Fasten plywood backing panels to substrate with fire retardant classification marking exposed to view; coordinate locations with equipment requiring backing panels.

I. Install continuous flexible flashing separator as follows:
1. Wood Preservative Treated Lumber: Between wood and metal decking.
2. Fire Retardant Treated Lumber: Between wood and metal decking.
3. Untreated Wood: Between wood and concrete or masonry.

J. Follow AWPA M4 for site-applied preservative treatment to cut surfaces of SBX preservative treated lumber.

END OF SECTION

SECTION 061600

SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Roof sheathing.
2. Structural panel sheathing.
3. Exterior wall sheathing.
4. Parapet sheathing.

B. Principal Products:
1. Plywood roof sheathing.
2. Plywood shear wall panels.
3. Oriented strand board wall sheathing.
4. Glass mat faced gypsum sheathing.
5. Glass mat faced parapet sheathing.
6. Fire retardant treatment.
7. Wood preservative treatment.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: Sheathing materials.
1. Fire retardant treatment.
2. Wood preservative treatment.
3. Fasteners and connectors.

B. Shop Drawings:

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer and Independent testing agency test results showing:
   1. Fire treated plywood performance.
   2. Preservative treated plywood performance.

B. Qualification Statements: installer and professional engineer.

1.5 QUALITY ASSURANCE

A. Mockups: Construct field air barrier assembly mockup including backup wall, typical penetrations, and glazing assemblies.
   1. Mockup Size: See Drawings.
   2. Demonstrate product interfaces, intersections, and terminations.
   3. Approved mockups may remain as part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store sheathing elevated above grade, protected from moisture. Maintain ventilation.

PART 2 PRODUCTS

2.1 ROOF SHEATHING

A. Plywood Roof Sheathing: APA Rated Sheathing, Exposure I, Structural I.
   1. Span Rating: 16/0.
   2. Thickness: 19/32 inch.
   3. Edges: Tongue and groove.

2.2 WALL SHEATHING

A. Plywood Shear Wall Sheathing: APA rated Exposure 1, Structural I.
   1. Span Rating: 16/0.
   2. Thickness: 1/2 inch.

B. Oriented Strand Board Wall Sheathing: APA rated Exposure 1, Structural I.
   1. Span Rating: 16/0.
   2. Thickness: See Drawings.

C. Paper Faced Gypsum Sheathing: ASTM C1396 water-resistant core and water repellent paper face.
   1. Manufacturers and Products:
      a. American Gypsum Exterior Gypsum Sheathing.

b. CertainTeed ProRoc Sheathing Treated Core SE.
c. Georgia-Pacific ToughRock Fireguard X Sheathing.
d. USG Sheetrock Brand Gypsum Sheathing.

2. Thickness: 5/8 inch, Type X.

D. Glass Mat Faced Gypsum Sheathing: ASTM C1177.
1. Manufacturers and Products:
a. American Gypsum M-GLASS Exterior Sheathing.
b. CertainTeed GlasRoc.
c. Georgia-Pacific DensGlass Sheathing.
d. National Gypsum Gold Bond eXP Sheathing.
e. USG Securock UltraLight Glass-Mat Sheathing.
2. Thickness: 1/2 inch, regular.

E. Glass Mat Faced Parapet Sheathing: ASTM C1177.
1. Manufacturers and Products:
a. Georgia-Pacific DensDeck Prime.
b. National Gypsum DEXcell FA Glass Mat Roof Board.
c. USG Securock UltraLight Glass-Mat Roof Board.

2.3 PERFORMANCE

A. Fire Resistance:
1. ASTM E119.
a. See Drawings for fire assembly designs.
2. NFPA 285.

2.4 FIRE RETARDANT TREATMENT

A. Fire Retardant by Pressure Process: ASTM D2898, exterior type.
1. Kiln dry after treatment: 15 percent maximum moisture content.
2. Surface Burning Characteristics per ASTM E84 with additional 20 minute testing period.
a. Flame Spread: 25, maximum.
b. Smoke Developed: 50, maximum.
3. Labeling: Per IBC requirements.

2.5 WOOD PRESERVATIVE TREATMENT

A. Wood Preservative, Pressure Treatment: AWPA U1 Category UC3b.
1. Kiln dry after treatment: 15 percent maximum moisture content.
2. Labeling: Per IBC requirements.

2.6 INSTALLATION ACCESSORIES

A. Fasteners: See Drawings for types, sizes, and spacing.
   1. General: Follow requirements for wood member size and type.
      a. Fire Retardant Treated Wood: Type 304 stainless steel.
      b. Preservative Treated Wood: Type 304 stainless steel.
      c. Other Applications: ASTM A153 hot-dip galvanized.
   2. Polymer-Coated Fasteners: Resistant to salt spray for more than 800 hours per ASTM B117.
      a. Color: Match item being fastened.
   3. Screws for Gypsum Sheathing:
      a. Steel Framing 33 mils Thick and Less: ASTM C1002.
      b. Steel Framing Greater than 33 mils Thick: ASTM C954.
      c. Include wafer heads and reamer wings.

B. Adhesives: Approved for use by sheathing and adhesive manufacturers, per APA AFG 01 or ASTM D3498.

C. Joint Materials: Tape, setting type taping compound, and setting type, sandable topping compound.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Install sound, undamaged materials.

B. Attach sheathing to substrate by anchoring and fastening per IBC Table 2304.10.2 Fastening Schedule.

C. Spacing: Leave expansion space at panel joints and adjacent assemblies as recommended by manufacturer.

D. Do not bridge building expansion joints with board materials.

3.2 INSTALLATION OF WOOD SHEATHING

A. Wall And Roof Sheathing:
   1. Screw panels to wood framing.
      a. Apply glue to framing before fastening sheathing.
   2. Screw panels to metal framing.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Follow ASTM C1280 and GA-253.

B. Screw gypsum sheathing to wood framing.

C. Screw gypsum sheathing to metal framing.

D. Install fasteners to bear against panel face. Do not install fasteners through panel face.

E. Fill joints and embed tape with setting type joint compound. Apply 3 coats; use a sandable product as third coat. Sand after each coat.

3.4 PROTECTION

A. Do not leave panels exposed to moisture. Replace wet panels or allow to dry completely before installing sealants, tape, weather barrier, and veneer.

END OF SECTION

SECTION 062023

INTERIOR FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Installation of standard-grade trim and carpentry at restrooms, installed and finished on-site.

B. Principal Products:
   1. Hardwood 1x6 square profile finger joint wall base, with opaque finish.
   2. Wood handrails and guardrail caps at ADMIN Building.

C. Related Requirements:
   1. Section 061053 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.
   2. Section 0991 "Painting" for priming and backpriming of interior finish carpentry.
   3. Section 099300 "Staining and Transparent Finishing" for finishing interior carpentry.

1.2 DEFINITIONS

A. MDO: Plywood with a medium-density overlay on the face.

B. NAUF: No added urea formaldehyde.

C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Samples: For each exposed product and for each color and texture specified.

B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

C. Samples for Verification:
   1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 12 linear inches for trim and 8 by 10 inches for panels.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
   1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
   2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Materials.
   1. 6.4 Low / No VOC Adhesives and Sealants:
      a. For all interior adhesives and sealants, use products that meet VOC level requirements in 018113 under Criterion 6.4.

B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's 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, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.

C. Softwood Plywood: DOC PS 1.

D. Hardboard: ANSI A135.4.

2.2 INTERIOR WOOD TRIM

A. Hardwood Lumber Trim for Opaque Finish (Painted Finish).
   1. Species and Grade: White Oak; Finish Schedule for color.
   2. Maximum Moisture Content: 9 percent.
   3. Finger Jointing: Not allowed.
   4. Gluing for Width: Not allowed.
   5. Veneered Material: Not allowed.
   6. Face Surface: Surfaced (smooth).
   7. Matching: Selected for compatible grain and color.
   8. Reveal: Fry Reglet as selected by Architect.

B. Lumber Trim for Opaque Finish (Painted Finish), Tag:
   1. Species and Grade:
      a. Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA B Finish.
   2. Maximum Moisture Content for Softwoods: 15 percent with at least 85 percent of shipment at 12 percent or less.
   3. Maximum Moisture Content for Hardwoods: 10 percent.
   4. Finger Jointing: Not allowed.
   5. Face Surface: Surfaced (smooth).
   6. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

C. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."
   1. Hardwood Moldings: MMPA WM 4, P-grade.
      a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
      b. Maximum Moisture Content: 9 percent.
   2. Finger Jointing: Allowed.
   3. Optional Material: Primed MDF.

2.3 INTERIOR WOOD HANDRAIL AND GUARDRAIL CAPS

A. Interior Stained Handrails and Guardrail Caps:
   1. Wood Species: Species as shown or selected; lumber suitable for stain or clear finish.
   2. Profile: 1 1/2 inches diameter as shown on Drawings.
   3. Stained Finish: To match color on flush wood doors.
   4. Application: ADMIN Building at open stairway.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
   1. Adhesives shall have a VOC content of 30 g/L or less.

C. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.

2.5 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
   1. Interior standing and running trim, except shoe and crown molds.

B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

C. Coordinate fabrication of wood guardrail caps with metal guardrailings.

PART 3 EXECUTION

3.1 EXAMINATION

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

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

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

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
   1. Use concealed shims where necessary for alignment.
   2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
   3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
   4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
   5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 INSTALLATION OF INTERIOR TRIM

A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
   1. Do not use pieces less than 24 inches (610 mm) long, except where necessary.
   2. Stagger joints in adjacent and related standing and running trim.
   3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
   4. Use scarf joints for end-to-end joints.
   5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
   6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
   7. Install trim after gypsum-board joint finishing operations are completed.
   8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
   9. Fasten to prevent movement or warping.
   10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 INSTALLATION OF SHELVING AND CLOTHES RODS

A. Cut shelf cleats at ends of shelves about 1/2 inch (13 mm) less than width of shelves and sand exposed ends smooth.
   1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
   2. Space fasteners not more than 16 inches (400 mm) o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal (89 mm actual) in width and wider.

3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
4. Remove adhesive that is squeezed out after fastening shelf cleats in place.

B. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches (800 mm) o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

C. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches (300 mm) o.c.

D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches (900 mm) o.c. and within 6 inches (150 mm) of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.
1. Install shelves, fully seated on cleats, brackets, and supports.
2. Fasten shelves to cleats with finish nails or trim screws, set flush.
3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

F. Install rod flanges for rods as indicated.
1. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
2. Install rods in rod flanges.

3.6 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.
1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

C. Replace upholstery fabric damaged during installation or work of other trades.

3.7 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 064116

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plastic-laminate-clad casework and cabinets.

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other sections to ensure that architectural casework items will be supported and installed properly.

B. Coordinate Work with placement of backing in the wall, rough-in of mechanical, plumbing, and electrical equipment and devices and other adjacent materials.

C. Coordinate Work with fabrication of countertop and other materials and products as part of work of this Section and as shown on Drawings.

1.3 SUBMITTALS

A. Submittals - General: AWI 100.

B. Action Submittals:
   1. Certification Labels: AWI Quality Certification Program.
   2. Product Data:
      a. Panel products.
      b. Hardware.
      c. Finish materials.
   3. Shop Drawings: Submit drawings indicating materials, dimensions, component profiles and elevations, design pattern, location of joints, assembly methods, joint details, fastening methods, accessory listings, and finishes.
      a. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcing specified in other Specification sections.
      b. Show locations and sizes of cutouts for accessories, plumbing, mechanical, electrical, and other items installed in casework.
      c. Show direction of grain for laminates and wood veneers where applicable.
   4. Samples - Verification:
      a. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish

required.

b. Provide one sample applied to core material with specified edge material applied to one edge.

C. Informational Submittals:
1. Quality Certification: Fabricator's signed statement that products conform to reference standard quality grades and other requirements.
2. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

D. Closeout Submittals:
1. AWI Quality Certification Program certificates confirming woodwork, including installation, follows duty level and grade requirements specified.

1.4 QUALITY ASSURANCE

A. Manufacturer/Fabricator Qualifications: Company specializing in manufacturing products specified in this Section with 5 years minimum documented experience; AWI Certified.

B. Installer Qualifications: Company specializing in performing work of this section with 5 years minimum documented experience and approved by manufacturer, if different than manufacturer installation crew.

C. Mockups: Build cabinet mockup to verify selections made under Sample submittals and to demonstrate conformance to performance requirements and aesthetic effects, and to set quality standards for fabrication and installation. Extent of mockups listed below as shown on Drawings or as directed by Architect.
1. Player Services cage position.
2. High Limits cage position.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage and Handling Requirements: AWI 200.

1.6 FIELD CONDITIONS

A. Maintain temperature and humidity in installation areas at levels intended for Owner's occupancy.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Furnish materials that conform to requirements of AWI Standards Latest Edition.

B. Substrate Sheets: One of the following.
   1. Fiberboard Core: ANSI A208.2, composed of agriculture waste, post-consumer waste fiber, or recovered wood fiber; of medium density, formaldehyde free, made with water resistant adhesive; 3/4 inch thick unless otherwise indicated on Drawings.
      a. Moisture resistant type for sink and lavatory counters and vanity tops.

C. Blocking, Shims, Nailers: Fire retardant treated softwood lumber conforming to requirements of Section 06 10 53.

2.2 CABINET HARDWARE AND ACCESSORIES

A. Hardware Standard: Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.

B. Hardware Finishes: Comply with BHMA 1301 for finishes indicated by BHMA Code Numbers.
   1. Concealed Hardware: Manufacturer standard finish conforming to product class requirements of BHMA A156.9.

C. Concealed Hinges: Blum; Clip Top Blumotion 110º hinges.
   1. Blum Blumotion 86º angle restriction nylon hinge clips required for cabinet doors that open against a perpendicular wall.

D. Catches: Unless otherwise note use B03141; magnetic, self-aligning type; provide B03131 push-in magnetic type or bullet catch where noted on Drawings.

E. Shelf Rests: B54013; adjustable clips that engage shelves to prevent accidental displacement.

F. Drawer Slides: Side-mounted, full extension, with ball bearings and stay-closed detent feature; conforming to BHMA A156.9, Grade required by cabinet duty level.

G. Locks: ANSI/BHMA A156.11, Grade 1.
   1. Door Locks: E07121.
   2. Drawer Locks: E07041.

H. Bumpers: Clear round vinyl, unless noted otherwise on Drawings.

I. Wire Management Grommets: Molded plastic with snap-in cap with slot for wire passage.
   1. Color: As selected by Architect from manufacturer standard colors.
   2. Quantity: One grommet per work station and service countertop.

J. Trash Grommet: Unless otherwise noted, provide “Model TM1B” 6-inch diameter grommet manufactured by Doug Mockett & Company, Inc.
   1. Finish: Stainless-steel.

K. Swing Down Bar Bracket: Provide “Hebgo Heavy-Duty Folding Table Bracket” manufactured by Häfele.
   1. Finish: As specified in Section 09 91 23 Interior Painting, color as selected by Architect.

2.3 MATERIALS - MISCELLANEOUS

A. Fasteners: Of type and size as required by conditions of use, hot-dip galvanized steel and painted.

B. Adhesives: Of type as recommended by millwork fabricator to suit application.

2.4 FABRICATION - GENERAL

A. Base Materials: Comply with requirements of reference standard unless noted otherwise.

B. Complete fabrication, finishing, and assembly before shipment insofar as possible.
   1. Disassemble components only as necessary for shipment and installation.

C. Where needed for site fitting, provide allowance for scribing and trimming.

D. Fabricate casework with shop-cut openings and mortises to receive hardware, accessories, equipment, plumbing fixtures, electrical work, and similar items.

E. Fabricate casework without any exposed-to-view fastening methods, when installed.

F. Shop-identify components for pattern matching during jobsite assembly.

G. Locate and cut openings accurately; use templates and roughing-in diagrams where available.

H. Smooth edges of cutouts. Seal edges of cutouts in countertops with water resistant coating.

2.5 FABRICATION - PLASTIC-LAMINATE-CLAD CASEWORK

A. Wood Cabinets General Requirements: ANSI/AWI 0641, Duty Level 3.

B. Aesthetic Grade: Custom.

C. Core Material: Medium density fiberboard.

D. Exposed Exterior and Exposed Interior Surfaces: High-pressure decorative laminate or as shown on Drawings.
   1. Horizontal Surfaces: Grade HGS.
   2. Vertical Surfaces: Grade VGS.
   3. Edge Banding: 0.12 inch PVC matching exposed laminate.

E. Semi-Exposed Surfaces: See Drawings for material and color.
   1. Edge Banding: 0.12 inch PVC edge banding matching panel surfaces.

F. Drawer Construction: Match cabinet duty level.
   1. Interior Surfaces: Thermoset decorative panels.
   2. Edge Banding: 0.12 inch PVC edge banding matching panel surfaces.

G. Sub-Tops: Provide plywood sub-tops below plastic laminate countertops.
   1. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded for wet areas.

H. Construction: Flush overlay.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify location and structural adequacy of blocking, backing and support framing.

B. Verify that Mechanical and Electrical Work affecting work of this Section are complete and approved before starting installation.

C. Verify that shop fabricated Work is complete, including back priming and removal of packing.

3.2 PREPARATION

A. Acclimate products to installation environment per AWI 200 and ANSI/AWI 0620.

B. Before installation, prime paint surfaces of products or assemblies to be in contact with cementitious materials.

C. Install wall cleats for products requiring hanging cleat level and securely in place into structural support or backing and blockings in the wall construction.

3.3 INSTALLATION

A. Follow ANSI/AWI 0620.

B. Installation Grade: Same as item being installed.

C. Do not install products that are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate work with minimum of joints or optimum jointing arrangements.

D. Do not install products with defective surfaces, sizes, patterns.

E. Coordinate installation with other materials and systems. Provide cutouts for mechanical, electrical, and other devices, equipment, and penetrations.

F. Install casework plumb, level, square, straight, without distortions, and accurately aligned. Use concealed shims where needed for alignment. Set casework without distortion that affects door or drawer alignment or operation.

G. Scribe and cut wood to fit adjoining construction with 1/32 inch maximum gaps. Do not use additional overlay trim to conceal larger gaps unless so detailed.

H. Fasten work rigidly and securely in place to anchorage devices or blocking built-in or directly attached to substrates.

I. Secure work to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.

J. Install cabinets without distortion so that doors and drawers fit openings properly and are accurately aligned.

K. Scribe and cut casework for accurate fit with adjacent construction.

L. Anchor cabinets securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction.

M. Fasten each cabinet to adjacent units to form stable, rigid assemblies.

N. Install shelves and drawers in place as per order of shop identification components for finish matching.

O. Align vertical and horizontal edges of doors and drawer fronts.

P. Adjust shelving for even spacing, unless otherwise shown on Drawings.

Q. Place door and drawer bumpers in inconspicuous place as necessary, preventing direct door and drawer contact to framing.

R. Bore holes for grommets in work station tops and service countertops in field per direction by Architect.

3.4 ADJUSTING

A. Adjust hardware for smooth, accurate operation, and so that doors and drawers remain in full contact closure unless opened.

B. Repair damaged and defective products and materials, where possible, to eliminate defects; where not possible to repair, replace defective products and materials. Adjust for uniform appearance.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Inspections provided through AWI Quality Certification Program. Program inspectors will perform installation inspection and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Non-Conforming Work: Remove and replace, and re-test.

3.6 CLEANING

A. Clean exposed and semi-exposed woodwork surfaces, including cabinet interiors.

B. Remove soiling and stains that show through or bleed through finishes.

C. Touch up shop-applied finishes to restore damaged or soiled areas.

D. Clean, lubricate, and adjust hardware.

3.7 PROTECTION AND CLOSEOUT

A. Protect installed work against damage, including soiling and staining.

B. Prior to Project closeout, check all woodwork for defects. Replace any work that is damaged beyond repair. Touch up and rework surfaces that have been marred and opened during course of Project. Use only workers skilled in touch-up work or who were the original finishers. Use only materials that are compatible with the finish.

C. Refinish joints that open during course of acclimation prior to Contract Closeout.

D. Replace work with same when touch up and rework to produce a smooth and even appearing finish and work is not achievable. The finished work shall be acceptable by Owner and Architect.

END OF SECTION

SECTION 071326

SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Below grade waterproofing at new Elevator pit.

B. Principal Products:
   1. Blindside sheet waterproofing, vertical applications.
   2. Blindside sheet waterproofing, horizontal applications.
   3. Molded sheet drainage panel.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate Work results of this Section with foundation insulation installation.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting concrete Work to receive waterproofing.
   2. Additional Attendees:
      a. Waterproofing membrane manufacturer.
      b. Concrete contractor.
      c. Installers of elements penetrating waterproofing.
      d. Earth retention Contractor.
   3. Additional Agenda Items:
      a. Concrete curing methods.
      b. Substrate preparation.
      c. Protecting and repairing waterproofing.

1.3 ACTION SUBMITTALS

A. Product Data: Waterproofing membrane and accessory products.

B. Shop Drawings: Show joint and termination conditions, details at penetrations, and conditions of interface with other materials.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer and Independent testing agency test results showing:
   1. Groundwater composition is not deleterious to waterproofing membrane.

B. Field Quality Control Submittals: Field inspection reports.

C. Manufacturer Reports: Field instruction and inspection reports.

D. Qualification Statements: Manufacturer, installer, and testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Trained or approved by manufacturer.

B. Mockups: Construct waterproofing, 100 sf minimum size. Demonstrate product interfaces, intersections, and terminations.
   1. Mockups Location: Field.
   2. Include inside and outside corners and at least one penetration detail.
   3. Conduct membrane adhesion testing and concrete moisture content testing at mockup location.
   4. Mockup to be reviewed by a manufacturer representative and Architect prior to proceeding with the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet waterproofing and accessories in manufacturer undamaged packaging.

1.8 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Temperature: Do not apply membrane when air or surface temperatures are below 40 degrees F.
   2. Precipitation: None occurring during installation of the Work or forecast within 24 hours.
   3. Protect rolls from direct sunlight until ready for use.

1.9 WARRANTY

A. Manufacturer Warranty:
   1. Waterproofing System: Warrant against total system failure.
      a. Failure includes inability of the Work to meet the performance requirements set forth in this and all Related Sections, including loss of adhesion between the waterproofing membrane and substrate.
      b. Provide for no-cost leak remediation to address incidental leakage in service.
   2. Warranty Includes:
      a. Removing and reinstalling protection board, drainage panels, and insulation.
      b. Insulation retains 80 percent of original published thermal value.
      c. Warranty Period: 10 years.
      d. Dollar Limit: None.

B. Installer Warranty:
   1. Waterproofing System: Warrant against total system failure.
      a. Failure includes inability of the Work to meet the performance requirements set forth in this and all Related Sections, including loss of adhesion between the waterproofing membrane and substrate.
      b. Provide for no-cost leak remediation to address incidental leakage in service.
   2. Warranty Includes:
      a. Removing and reinstalling protection board, drainage panels, and insulation.
      b. Insulation retains 80 percent of original published thermal value.
      c. Warranty Period: 2 years.
      d. Dollar Limit: None.

PART 2 PRODUCTS

2.1 BLINDSIDE SHEET WATERPROOFING

A. General: Provide waterproofing components manufactured or recommended by primary membrane manufacturer for a fully compatible system.

B. Blindside Sheet Waterproofing, Vertical Applications: Composite self-adhering or mechanically binding sheet membrane of HDPE film coated with pressure sensitive adhesive or nonwoven fabric facer or hybrid-bonding flexible polyolefin membrane.
   1. Manufacturers and Products:
      a. Henry Blueskin PreSeal 320, as Basis-of-Design.
      b. AVM Aussie Skin 550.
      c. Carlisle Coating & Waterproofing MiraPLY V.
      d. GCP Applied Technologies Preprufe Plus.
      e. Polyglass USA Mapeproof AL Pro.
      f. Polyguard Products Underseal Blindside Membrane.
      g. Sika SikaProof A+.
      h. W.R. Meadows.
   2. Tensile Strength: ASTM D412, 800 psi minimum.
   3. Low-Temperature Flexibility: ASTM D1970, Pass at minus 10 degrees F.

4. Peel Adhesion to Concrete: ASTM D903 modified, 5 pounds/inch, minimum.
5. Lap Adhesion: ASTM D1876 modified, 2.5 pounds/inch, minimum.
6. Hydrostatic Head Resistance: ASTM D5385 modified, 231 feet, minimum.
7. Puncture Resistance: ASTM E154, 100 pounds, minimum.
8. Water Vapor Permeance: ASTM E96 Water Method, 0.06 perms, maximum.
9. Water Absorption: ASTM D570, 0.5 percent, maximum.

C. Blindside Sheet Waterproofing, Horizontal Applications: Bonded HDPE, flexible polyolefin, or polyethylene sheet, multilayered composite sheet membrane.
   1. Manufacturers and Products:
      a. Henry Blueskin PreSeal 435, as Basis-of-Design.
      b. AVM Aussie Skin 550.
      c. Carlisle Coating & Waterproofing MiraPLY H.
      d. GCP Applied Technologies Preprufe Plus.
      e. Polyguard Products Underseal Underslab Membrane.
      f. Sika SikaProof A+.
      g. W.R. Meadows.
   2. Tensile Strength: ASTM D412, 800 psi minimum.
   3. Low-Temperature Flexibility: ASTM D1970, Pass at minus 10 degrees F.
   4. Peel Adhesion to Concrete: ASTM D903 modified, 5 pounds/inch, minimum.
   5. Lap Adhesion: ASTM D1876 modified, 2.5 pounds/inch, minimum.
   6. Hydrostatic Head Resistance: ASTM D5385 modified, 231 feet, minimum.
   7. Puncture Resistance: ASTM E154, 100 pounds, minimum.
   8. Water Vapor Permeance: ASTM E96 Water Method, 0.06 perms, maximum.
   9. Water Absorption: ASTM D570, 0.5 percent, maximum.

D. Installation Materials:
   1. Transition Strips: Manufacturer recommended self-adhering strips or tapes.
   2. Fasteners: Manufacturer recommended material and type.
   3. Liquid Accessory Materials: Manufacturer recommended VOC compliant primers, surface conditioners, and patching membranes.
   4. Mastic, Adhesives, and Tapes: Manufacturer recommended products.
   5. Termination Bars: Stainless steel, approximately 1 by 1/8 inch thick, predrilled on 9 inches centers.

2.2 MOLDED SHEET DRAINAGE PANELS

A. Molded Sheet Drainage Panel, Nonwoven Geotextile Type: Composite drainage panel with nonbiodegradable molded plastic sheet drainage core, and nonwoven, needle punched geotextile facing laminated to one side of core.
   1. Manufacturers and Products:
      a. Henry Drain Board DB 200S, as the Basis-of-Design.
      b. American Hydrotech.
      c. Carlisle Coatings & Waterproofing.
      d. GCP Applied Technologies.
   2. Flow Rate: Vertical flow 15 gpm per foot, minimum.
   3. Compressive Strength: 30,000 psf.
   4. Openings: No. 40 to 70 sieve.

2.3 INSULATION

A. Insulation, General: See Section 072100.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces are free of matter detrimental to adhesion or application of waterproofing system.

B. Verify items penetrating substrate surfaces to receive waterproofing are securely installed.

C. Verify substrate surface slopes to drain for horizontal waterproofing applications.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Do not apply waterproofing to surfaces unacceptable to manufacturer and installer.

C. Seal cracks and joints with sealant materials as recommended by waterproofing manufacturer.

D. Apply surface conditioner at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.

3.3 MEMBRANE INSTALLATION

A. Comply with manufacturer instructions.

B. Roll out membrane. Minimize wrinkles and bubbles.

C. Remove release paper layer. Roll out on substrate with a mechanical roller for full contact bond.

D. For vertical application, mechanically fasten top leading edge approximately 1/2 inch from edge of sheets.

E. For vertical application, terminate membrane by embedding into and covering with liquid membrane and securing with a termination bar.

F. Lap sides and ends of waterproofing sheets.

G. Lap sides and ends of waterproofing sheets, 3 inches minimum.
   1. Modified Bituminous Sheet Waterproofing: Seal all laps and edges with 1/4 by 1 inch

seal of liquid membrane.

H. Reinforce joints with multiple membrane layers.

I. Horizontal Applications: Install with membrane face against substrate. Install with accurate alignment, end laps, overlaps, and seams.

J. Lap joints on sloped surfaces in direction of drainage with higher sheets lapping lower sheets.

K. Install and seal flexible flashings.

L. Seal membrane and flashings to adjacent materials.

M. Seal and counterflash penetrations, including fastener penetrations.

3.4 DRAINAGE AND PROTECTION BOARD INSTALLATION

A. Place board with correct side outward, directly against membrane, butt joints, place to encourage drainage downward.

B. Adhere board to substrate with mastic. Scribe and cut boards around projections, penetrations, and interruptions.

3.5 FIELD QUALITY CONTROL

A. Manufacturer Representative: Owner will engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.
   1. Failed Test Retest Cost: Contractor responsibility.

3.6 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing, board insulation, and drainage panels during remainder of construction period.

C. Correct or replace damaged or deficient waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION

SECTION 071800

TRAFFIC COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Vehicular traffic-bearing coating in the Maintenance Building for Lift traffic.

B. Principal Products:
   1. Cold liquid-applied urethane traffic-coating system.
   2. Installation accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Each traffic coating system component.
   2. Initial selection color Samples.

B. Shop Drawings:
   1. Traffic coating locations and extent.
   2. Substrate, joint, and crack preparation details.
   3. Flashing.
   4. Penetrations.
   5. Termination conditions.

C. Samples: 6 by 6 inch cured Sample on rigid backing for each exposed product, color and texture.
   1. Step back each layer 1/2 inch.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty documentation.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Traffic coating manufacturer trained.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations:
   1. Temperature: Within the range of ambient and substrate temperatures recommended by traffic coating manufacturer.
   2. Precipitation: None occurring and none predicted within 4 hours.

1.7 WARRANTY

A. Manufacturer Warranty: Warrant coating against adhesion loss and water leakage through coating.
   1. Warranty Period: Five years.

PART 2 PRODUCTS

2.1 VEHICULAR TRAFFIC COATING

A. Traffic Coating: ASTM C957, high-solids, multiple-component, cold liquid-applied urethane waterproofing membrane with integral wearing surface.
   1. Manufacturers and Products:
      a. Sikalastic Vehicular Traffic 2500.
         1) Base Coat: Sikalastic M270 NP.
         2) Intermediate Coat: Sikalastic TC 275.
         3) Top Coat: Sikalastic TC 295.
      b. Or approved equal.
   2. Cured Membrane Properties:
      a. Base Coat Adhesion: ASTM D4541, 275 psi, minimum.
      b. Top Coat Tensile Strength: ASTM D412, 2,500 psi, minimum.
      c. Ultimate Elongation: ASTM D412, 145 percent, minimum.
      d. Top Coat Abrasion Resistance: ASTM D4060, 47 mg maximum.
      e. Top Coat Hardness: ASTM D2240 Shore A, 88, minimum.
      f. Fire Rating: UL 790 or ASTM E108, Class A.
   3. Accessory Materials:
      a. Primer: Manufacturer recommended for substrate and conditions.
      b. Aggregate: Manufacturer recommended particle sizes, shapes, and minimum hardness for substrate and service conditions.
      c. Joint Sealants: Section 079200.
      d. Flashing and Transition Treatment: Nonstaining, manufacturer recommended liquid product.
   4. Color: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate is ready to receive Work, surface is clean, dry and free of substances which could affect bond.

B. Do not begin Work until concrete substrate has cured 28 days, minimum, and measured moisture content is not greater than 16 percent.

3.2 PREPARATION

A. Clean substrate surfaces free of foreign matter.

B. Patch concrete substrates with filler to produce surface conducive to bond.

C. Securely install cant strips at intersecting surfaces.

D. Prepare, treat, and fill substrate cracks.

E. Remove drain covers and close off drains.

F. Protect adjacent surfaces.

3.3 INSTALLATION

A. Installation - General: Follow ASTM C1127.
   1. Thickness: Minimum required to achieve specified properties.

B. Transition to Vertical Surfaces: Cove 4 inches minimum up vertical surfaces.

C. Apply broadcast aggregate surfacing to final wear coat before set and cross-roll.

D. Remove loose aggregate, then install top coat.

E. Apply sealant to junction of horizontal and intersecting surfaces to achieve watertight seal.

3.4 PROTECTION

A. Do not permit traffic over unprotected surfaces.

END OF SECTION

SECTION 071900

WATER REPELLENTS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Water repellent treatment on masonry surfaces.
2. Clear non-sacrificial, anti-graffiti coating for Ground Face CMU.

B. Principal Products:
1. Water repellent sealer.
2. Clear transparent, water based, sacrificial graffiti resistant coating.

C. Related Requirements:
1. Section 018316 Exterior Enclosure General Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Shop Drawings: Show surfaces receiving each water repellent.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer test results showing:
1. Water vapor transmission.
2. VOC Content.

B. Field Quality Control Submittals: Field test reports.

C. Manufacturer Reports: Field instruction and test reports.

D. Qualification Statements: installer.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer trained or approved.

B. Preconstruction Testing: Test each product. Complete testing 30 days, minimum, before scheduled field installation.

C. Field Samples: Apply water repellent to <substrate>, 25 sf minimum size. Demonstrate application rate, appearance, and water-repellent performance.

D. Mockups:
   1. Apply water repellent to mockups specified in Section 042223, 042613, and 047200. Demonstrate installation quality.
   2. Graffiti Testing: Apply graffiti-resistant water repellent to mockups specified in Section 042000.
      a. Spray paint over water repellent; allow to dry 24 hours, then remove paint.

1.6 FIELD CONDITIONS

A. Limitations: Proceed with application only when existing and forecasted weather and substrate conditions fall within manufacturer acceptable range.

PART 2 PRODUCTS

2.1 PENETRATING WATER REPELLENTS

A. Water-based Silane-Siloxane Water Repellent: 400 g/L VOC content, maximum.
   1. Manufacturers and Products:
      a. PROSOCO Weather Seal Siloxane PD, as Basis-of-Design.
      b. Pecora KlereSEAL 910W.
      c. Pittsburgh Paints Company Perma-Crete AQUA-PEL.
      d. Sika Sikagard-277 Enviroseal.
      e. W.R. Meadows INTRAGUARD.

2.2 GRAFFITI-RESISTANT PENETRATING WATER REPELLENT

A. Penetrating Water Repellent: Clear, non-color-enhancing, non-sacrificial permanent graffiti protection coating.
   1. Manufacturers and Products:
      a. PROSOCO Blok-Guard & Graffiti Control WB 15, as Basis-of-Design.
      b. Diedrich Technologies 333 Omegaseal Water Repellent & Graffiti Management.
      c. Evonik Protectosil ANTIGRAFFITI.
      d. Professional Products of Kansas Water Sealant.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify joint sealants are installed and cured.

B. Verify surfaces to be coated are properly cured, dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellents.

3.2 PREPARATION

A. Protection:
   1. Protect adjacent surfaces not scheduled to receive water repellents.
   2. Protect landscaping, property, and vehicles.

B. Remove dust, dirt, oil, grease, chemical films, coatings and other contaminants before application.

3.3 APPLICATION

A. Apply even distribution of water repellents.

B. Apply manufacturer recommended coat quantity.

C. If applied to unscheduled surfaces, remove immediately.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Coverage Test: Saturate with water a repellent-treated surface to verify uniform performance and appearance.
   1. Test Quantity: 10 linear feet.

C. Non-Conforming Work: Make corrections or replace, and re-test.

3.5 PROTECTION

A. Protect sealed surfaces from damage during construction.

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Exterior wall insulation.
2. Concealed blanket insulation for stud cavities.

B. Principal Products:
1. Unfaced mineral wool board.
2. Unfaced mineral wool fiber blanket.

C. Related Requirements.
1. Section 071326: Sheet waterproofing.
2. Section 072119: Foamed-in-place insulation.
3. Section 074113.16: Standing-seam metal roof panels for rigid roof insulation.
4. Section 072500: Weather barriers.
5. Section 075000: Membrane roofing for polyisocyanurate board insulation.

1.2 REFERENCES

A. Abbreviations and Acronyms:
1. SPF: Spray polyurethane foam.

1.3 ACTION SUBMITTALS

A. Product Data.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer and independent testing agency test results showing:
1. Thermal performance.
2. Surface burning characteristics.
3. Combustibility.
4. Density.

1.5 QUALITY ASSURANCE

A. Preconstruction Testing: Complete testing 30 days minimum before scheduled field installation.
   1. Bond Strength: Test foamed-in-place insulation for adhesion to metal, masonry, and concrete per ABAA T0002 to determine need for primer and substrate preparation.
   2. Density: Test spray foam at two Architect directed locations for core density per ASTM D1622.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store insulation in dry location, protected from elements.
   2. Handle insulation to prevent soiling and damage.
   3. Foam Board: Protect combustible insulation against ignition.

PART 2 PRODUCTS

2.1 FIBROUS BOARD INSULATION

A. Unfaced Mineral Wool Board: ASTM C612, Type III, IVA, or IVB; continuous insulation applications.
   1. Manufacturers and Products:
      a. ROCKWOOL Comfortboard 110, as Basis-of-Design.
      b. Johns Manville.
      c. Owens Corning Thermafiber.
   2. Surface Burning Characteristics: ASTM E84.
      a. Flame Spread Index: 25, maximum.
      b. Smoke Developed Index: 50, maximum.
   3. Combustion: Passes ASTM E136.

2.2 BLANKET INSULATION

A. Unfaced Mineral Wool Fiber Blanket: ASTM C665, Type I.
   1. Manufacturers and Products:
      a. ROCKWOOL COMFORTBATT, as Basis-of-Design.
      b. Johns Manville TempControl Mineral Wool.
      c. Owens Corning Thermafiber UltraBatt.
   2. Surface Burning Characteristics: ASTM E84.
      a. Flame Spread Index: 25, maximum.
      b. Smoke Developed Index: 50, maximum.
   3. Combustion: Passes ASTM E136.

2.3 INSULATION ATTACHMENT

A. Insulation Adhesives: Products compatible with insulation and substrates, capable of securing insulation to substrate without damaging insulation or substrates.

B. Mechanical Fasteners: Insulation manufacturer recommended screws with integrated insulation-retaining washers for attachment through sheathing to metal framing.

C. Spindle-Type Adhered Anchors for Temporary Support During Installation: Galvanized steel plate with galvanized or copper-coated steel spindle.
   1. Manufacturers and Products:
      a. AGM Industries.
      b. Gemco.
      c. Gripnail.
      d. Midwest Fasteners.
   2. Spindle Length: Suited to insulation depth.

D. Insulation-Retaining Washers: Galvanized steel self-locking washers.
   1. Washer Size: Recommended by anchor manufacturer.

E. Anchor Adhesive: Type recommended by anchor manufacturer for substrate.

F. Wire Mesh: 20 gauge galvanized wire hex netting with 2 inch openings.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrates and remove projections and appurtenances that may damage insulation or inhibit adhesion.

3.2 INSTALLATION - GENERAL

A. Extend insulation to cover entire area shown to be insulated.

B. Insulate tightly around obstructions and penetrations.

C. Fill voids with compressed fibrous or closed-cell spray foam insulation.

3.3 INSTALLATION OF WALL CONTINUOUS INSULATION

A. Mineral-Wool Board Insulation: Mount insulation boards on fasteners. Butt units tightly.
   1. Space fasteners as recommended by manufacturer.
   2. Install washers to hold boards firmly against substrate.

3.4 INSTALLATION OF FRAMED WALL INSULATION

A. Blanket Insulation: Fill cavities between framing members with insulation. Snugly fit insulation.
   1. Recessed Lighting Fixtures: Maintain 3-inch clearance between insulation and fixtures not rated for insulation contact.
   2. Metal-Framed Wall Cavities over 96 Inches High:
      a. Unfaced Blankets: Apply insulation fasteners to stud faces before installing insulation.

3.5 INSTALLATION OF CURTAIN-WALL INSULATION

A. Board Insulation: Secure insulation to substrate with metal clips and straps or integral frame pockets.
   1. Space clips as recommended by insulation manufacturer.
   2. Maintain air space between insulation and spandrel glass.
   3. Joint Firestopping: Install insulation per tested firestopping assembly.

3.6 PROTECTION

A. Protect insulation from damage due to weather, ultraviolet radiation, physical abuse, and other causes. Provide temporary coverings or enclosures until permanent construction is completed.

END OF SECTION

SECTION 072119

FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closed-cell spray polyurethane foam.
   2. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation, whether or not such items are included in the Specifications or indicated on the Drawings.

B. Related Requirements:
   1. Section 072100 Thermal Insulation.

1.2 SUBMITTALS

A. Action Submittals:
   1. Product Data: For each type of product.

B. Informational Submittals:
   1. Qualification Data: For Installer.
   2. Product Test Reports: For each product, for tests performed by a qualified testing agency.
   3. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, density of at least 1.5 lb./cu. ft. and aged R-value at 1-inch thickness of at least 6.2 deg F x h x sq. ft./Btu at 75 deg F.
   1. Products: Subject to compliance with the Contract Documents, provide one of the following.

a. "Heatlok HFO Pro" manufactured by Huntsman Building Solutions.
b. "JM Corbond IV" manufactured by Johns Manville.
c. "SealTite PRO HFO" manufactured by Carlisle.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.
3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material supplied or recommended in writing by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION

SECTION 072600

VAPOR RETARDERS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Underslab vapor retarder.

B. Principal Products:
   1. Non-reinforced polyethylene vapor retarders.

C. Related Requirements:
   1. Section 033000: Cast-in-Place Concrete.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate under slab vapor retarder with concrete slab construction.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Under slab vapor retarders.

1.4 WARRANTY

A. Manufacturer Warranty:
   1. Underslab vapor retarder: Warrant against product failure.
      a. Failure includes manufacturing defects.
      b. Warranty Period: lifetime of building.
      c. Dollar Limit: None.

PART 2 PRODUCTS

2.1 UNDER SLAB POLYETHYLENE VAPOR RETARDERS

A. Vapor Retarders: Sheet membrane complying with ASTM E1745, Class A.
   1. Manufacturers and Products:
      a. Stego Industries Stego Wrap 15-Mil, as basis-of-design.
      b. W. R. Meadows PERMINATOR 15-mil.
      c. Raven Industries, Vapor Block 15.
   2. Permeance: 0.01 perms, maximum per ASTM E96 or ASTM F1249.

B. Installation Accessories:
   1. Seam Tape: Vapor retarder manufacturer standard product.
   2. Penetration Sealer: Vapor retarder manufacturer standard product.
   3. Pipe Boots: Vapor retarder manufacturer standard product.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrates of substances and projections harmful to vapor retarders.

3.2 INSTALLATION

A. Installation - General: Comply with ASTM E1643.

B. Install vapor retarders over prepared grades. Lap joints 6 inches, minimum and seal with tape. Seal to perimeter foundation walls.

C. Seal around utility penetrations and columns.

3.3 PROTECTION

A. Protect vapor retarders. Repair damage before pouring floor slab.

END OF SECTION

SECTION 072726

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vapor-permeable, fluid-applied air barriers.

B. Related Requirements:
   1. Section 014000 “Quality Requirements” for mockups using materials provided in this section.
   2. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.2 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 accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.
   1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
   2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   3. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. 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.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Provide materials as required by Section 01 43 39 “Mockups.”.

1.7 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.

1.8 COORDINATION

A. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.

B. Provide sill flashing membrane and sheet metal flashings to direct water to the exterior before windows and doors are installed.

C. Install window and door head flashing immediately after windows and doors are installed.

D. Install diverter flashings wherever water can enter the assembly to direct water to the exterior.

E. Install parapet cap flashing and similar flashing at copings and sill to prevent water entry into the wall assembly.

F. Install cladding within 60 days of waterproof air barrier installation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing 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

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous 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 2357.

2.3 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils over smooth, void-free substrates.
   1. Products: Subject to compliance with requirements, provide W. R. Meadows, Inc; Air-Shield LMP or comparable product.
   2. Color: Black.
   3. 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, Desiccant Method,

Procedure A.
c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
f. UV Resistance: Indefinitely for rain screen applications.

2.4 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils over smooth, void-free substrates.
1. Products: Subject to compliance with requirements, provide one of the following:
a. W. R. Meadows, Inc; Air-Shield TMP, as Basis-of-Design.
b. BASF Corporation; Wall Systems; Enershield-HP.
c. Dow Corning Corporation; Dow Corning® DefendAir 200.
d. Hohmann & Barnard, Inc; Enviro-Barrier VP.
e. Pecora Corporation; Pecora XL-Perm.
f. Polyguard Products, Inc.; Polyguard Airlok Flex VP.
g. PROSOCO, Inc; R-Guard Spray Wrap MVP.
h. Sto Corp; Sto EmeraldCoat®.
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, Desiccant Method, Procedure A.
c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
f. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.
3. Locations: Use in concealed locations with no long term UV exposure or exposure to the elements.

2.5 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

D. Joint Reinforcing Fabric: Air-barrier manufacturer's nonwoven, reinforcement fabric.

E. Joint Reinforcing Strip: Air-barrier manufacturer's self-adhering glass-fiber-mesh tape.

F. Substrate-Patching and Leveling Material for Concrete and Masonry: Manufacturer's standard trowel-grade substrate patching material.

G. Tape: Air-barrier manufacturer's standard pressure-sensitive adhesive tape.

H. 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.

I. Modified Bituminous Transition 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.

J. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
   1. HYPERLINK "http://www.specagent.com/Lookup?ulid=6265" Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; Dow Corning® 123 Silicone Seal.
      b. GE Construction Sealants; Momentive Performance Materials Inc.; US11000 UltraSpan.
      c. Pecora Corporation; Sil-Span.
      d. Tremco Incorporated; Spectrem Simple Seal.

K. 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.
   2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
   3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.

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

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. 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. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Repair cracks up to 1/8 inch wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint treatment material with a trowel, drywall or putty knife to cover the reinforcement.

F. 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.

G. 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.

H. Bridge isolation joints, expansion joints, and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water 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 transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
   3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. 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.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. 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.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip or preformed silicone extrusion 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. Transition Strip: Roll firmly to enhance adhesion.
   2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. 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.

3.4 JOINT TREATMENT

A. Concrete: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
   1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air-barrier coating material and embed joint reinforcing in preparation coat.

3.5 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply 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 and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
   1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
   3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
   1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
   1. Vapor-Permeable, Low-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

D. Do not cover air barrier until it has been tested and inspected by 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: 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. Air-barrier dry film thickness.
   3. Continuous structural support of air-barrier system has been provided.
   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 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.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have 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 (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests: As determined by testing agency from among the following tests:
1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers or ASTM E 1186, chamber depressurization using detection liquids.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for a minimum air barrier adhesion of 15 lbf/sq.in. for each 2500 sq. ft. of installed air barrier or part thereof. Note: Destructive Test. Test specimens to failure and then repair failed area.
4. Water Penetration Test: Engage a qualified testing agency to test areas designated according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure differential of 6.24 lbf/sq. ft., and shall not evidence water penetration. Perform a minimum of one test for every 7,500 sq. ft. of air barrier system at location(s) directed by Architect. Perform 2 additional tests for any failed test following remediation of defects that allow water penetration.

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.

F. Prepare test and inspection reports.

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 recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials 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 in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION

SECTION 074113.16

STANDING-SEAM METAL ROOF PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Standing seam factory-prefabricated engineered aluminum roofing.

B. Principal Products:
   1. Metal roofing panels.
   2. Underlayment.

C. Related Requirements.
   1. Section 076200 "Sheet Metal Flashing and Trim"; roof drainage fabrications.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate roofing with flashing, roof drainage, trim, and other adjoining work.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Shop Drawings: 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.
   1. Provisions for thermal expansion and contraction.
   2. Built-in gutters and drain connections.

C. Samples:
   1. Standing Seam Roofing: Full width samples, 12 inches long, minimum.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality Control Submittals: Field inspection reports.

1.5 QUALITY ASSURANCE

A. Mockup: Construct one complete terrace covering. Demonstrate installation detailing, interfaces, intersections, and terminations.
   1. Approved samples establish work results standard.
   2. Approved samples may remain as part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store roofing panels and other items elevated above grade, protected from precipitation and stormwater runoff.
   2. Handle metal panels to prevent soiling and damage.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Precipitation: None occurring and none predicted during installation.

1.8 WARRANTY

A. Two (2) Year Workmanship Warranty:
   1. The Contractor warrants to the Owner that all labor and workmanship performed in the installation of the standing seam metal roofing system will be free from defects that result in water infiltration or structural degradation for a period of two (2) years from the Effective Date.
   2. Remedy: If a workmanship defect is discovered within this two-year period, the Contractor will, at its own expense, repair or replace the affected area to restore it to a watertight condition.

B. Twenty (20) Year Roofing Assembly Warranty:
   1. The Contractor warrants that the complete roofing assembly—consisting of the premium MBCI Superlok standing seam metal panels, clips, fasteners, underlayment, flashing, and termination details—will remain structurally sound, weather-tight, and free from material defects for a period of twenty (20) years from the Effective Date. This warranty guarantees that the system will perform safely as a cohesive unit under normal weather conditions.
   2. Remedy: In the event of an assembly failure or system leak resulting from defective components or system integration, the Contractor will repair or replace the necessary components of the assembly to restore structural integrity and weather-tightness.

C. Twenty (20) Year Finish and Coating Warranty:
   1. The Contractor warrants that the factory-applied finish (paint/coating) on the MBCI Superlok standing seam metal panels will not chip, crack, peel, flake, or excessively fade or chalk for a period of twenty (20) years from the Effective Date, in accordance with ASTM and manufacturer standards for normal atmospheric exposure.
   2. Remedy: If the finish fails to meet these standards, the Contractor (in conjunction with the material manufacturer) will clean, repaint, repair, or replace the affected panels at no cost to the Owner.

D. Mandatory Forty-Eight (48) Hour Notice Requirement:
   1. The Contractor warrants that the factory-applied finish (paint/coating) on the MBCI Superlok standing seam metal panels will not chip, crack, peel, flake, or excessively fade or chalk for a period of twenty (20) years from the Effective Date, in accordance with ASTM and manufacturer standards for normal atmospheric exposure.
   2. Remedy: If the finish fails to meet these standards, the Contractor (in conjunction with the material manufacturer) will clean, repaint, repair, or replace the affected panels at no cost to the Owner.

E. Exclusions and Limitations:
   1. This warranty does not cover damage caused by:
      a. Acts of God, severe weather events exceeding design specifications, or natural disasters.
      b. Alterations, additions, or repairs made to the roof assembly by parties other than the Contractor.
      c. Mechanical damage, structural settling, or movement of the building substrate.
      d. Failure of the Owner to perform routine, reasonable maintenance.

PART 2 PRODUCTS

2.1 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.

B. Metal Standing Seam Roofing: Architectural panel roofing system formed with vertical ribs at panel edges and flat pan between ribs.
   1. Manufacturers and Products:
      a. MBCI; Superlok Standing Seam System, as Basis-of-Design.
      b. AEP Span.
      c. ATAS International PC System.
      d. Berridge.
      e. Centria Architectural Systems.
      f. Fabral.
      g. Petersen Aluminum PAC-CLAD.
      h. Taylor Metal Products.

2. Panel Clips: Aluminum designed to fit between two adjacent panels and secure both panels.
3. Seam Height: Nominal 2 inches.
4. Seam Spacing: Nominal 16 inches.
5. Steel Panel System: ASTM A792 Galvalume-coated steel, 0.028 inch thick minimum.
    a. Panel Thickness: 24 gauge , standard.
    b. Panel Surface: 1/16-inch Smooth Striated.
    c. Exterior Finish: PVDF coating system (MBCI Signature 300).
        1) Color: Architect selected.
    d. Concealed Finish: Siliconized polyester coil coat.

C. Clips: Stainless steel, thickness and configuration required to accommodate thermal and wind movement.

D. Accessories: Provide components required for complete, weathertight roofing system. Components include, but are not limited to clips, sealants, closure strips, and similar items.

E. Trim: Provide flashing and trim formed from same material and finish as metal roofing. Components include, but are not limited to, eaves, rakes, corners, ridges, and fillers.

F. Fasteners: Self-tapping screws designed to withstand design loads.

2.2 UNDERLAYMENT MATERIALS

A. Waterproof Underlayment: High temperature-resistant, self-adhesive modified bitumen sheets recommended by manufacturer for use under metal roofing.
1. Manufacturers and Products:
    a. HPM Custom Metalroofing, supplier recommended underlayment, as Basis-of-Design.
    b. Carlisle WIP 300HT.
    c. GCP Applied Technologies Grace Ice and Water Shield HT.
    d. Henry Company Blueskin PE200 HT.
    e. Owens Corning WeatherLock Metal High Temperature Underlayment.
    f. Polyglass Polystick P.

2.3 PERFORMANCE

A. General: Resist loads from design wind speed without damage, including uplift.

B. Structural Loads:
1. Wind Load: See Structural Drawings.

C. Wind-Borne Debris Resistance:
1. ASTM E1886 missile impact and cyclic-pressure for 150 MPH wind speed.

D. Environmental Performance:
1. Expansion and Contraction: Withstand thermal cycling over 120 degrees F ambient and

180 degrees F on material surfaces.

2.4 FABRICATION

A. Fabrication Standard: SMACNA "Architectural Sheet Metal Manual."

B. Form pieces in panels of lengths shown on Drawings.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

E. Fabricate flashing and termination trim from same material as roof panels.

F. Built-In Gutters: Fabricate from same material as roof panels.
   1. Hem exposed edges.
   2. Provide straps to support outer edge and provide continuous anchorage cleats.
   3. Rivet and seal seams watertight.
   4. Provide 4-inch outlet tubes of stainless steel with welded flanges riveted and sealed watertight to gutter body.
   5. Provide stainless steel wire guards in outlet tubes with clips that prevent accidental displacement but allow removal for cleaning.

2.5 ALUMINUM FINISHES

A. Exposed Color Coating: Two-coat PVDF finish with minimum 70 percent Kynar 500 resin by weight in color; AAMA 2605.
   1. Color: See Finish Schedule.

B. Concealed Surfaces: At contractor's option, concealed surfaces may receive powder or acrylic coating that matches color of exterior finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
   1. 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.

3.2 PREPARATION

A. Roof Sheathing: Tape seams between sheathing panels.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Underlayment: Install over entire roof surface. Lap edges 6 inches minimum. Roll laps flat.

B. Line inside surfaces of built-in gutters with underlayment.

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels in orientation, sizes, and locations indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Flash and seal metal panels at perimeter of all openings and edges. Fasten with self-tapping screws.
   2. Install screw fasteners in predrilled holes.
   3. Locate and space fastenings in uniform vertical and horizontal alignment.
   4. Install flashing and trim as metal panel work proceeds.

B. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

C. 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.

D. Flashing and Trim: Comply with performance requirements, details shown on Drawings, and SMACNA "Architectural Sheet Metal Manual."

E. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as shown and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

A. 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

SECTION 074213

METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Galvanized and coated prefinished metal panel system.
   2. Associated flashings and accessories.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized), or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
   2. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
   3. ASTM D2244 - Method for Instrumental Evaluation of Color Differences of Opaque Materials.
   4. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

A. Metal wall panel system includes sheet metal siding system, including attachment system, furring channels, adjacent copings, flashings and trim.

B. Panel system shall be capable of withstanding code imposed design loads, with maximum deflection of L/180, for each loading and support condition indicated.

C. Wall panel system shall be designed and installed to preclude entrance of water into the building interior or into concealed mansard and parapet spaces, and shall drain condensation occurring within the panel system to the building exterior.

D. The wall panel system shall be capable of accommodating movement of supporting components and thermal movement of the panels, themselves, without buckling, failure of joint seals, undue stress on fasteners, and other detrimental effects.

E. System shall accommodate tolerances of the structure.

F. Finish on installed materials shall not show a color change greater than 5 NBS color units, per ASTM D2244, and shall not show chalking in excess of 8, per ASTM D4214, over a period of twenty years.

1.4 SUBMITTALS

A. Product Data: Submit for all materials and proprietary systems proposed for the work.

B. Sustainable Design Submittals: See Division 1 for Sustainability Requirements and for additional requirements.

C. Shop Drawings - Delegated Design:
1. Indicate material profile, dimensions, jointing details, furring, fastening methods, flashings, penetrations, and installation details.
2. Include manufacturer's installation instructions for manufactured items incorporated in work.
3. Indicate all flashing related to the system, including adjacent receivers and cap flashing to be provided under Section 07 62 00, Sheet Metal Flashing and Trim.

D. Samples:
1. Submit one sample of panel material, of sufficient size to indicate profile and color.
2. Submit sample of closure piece.

1.5 QUALITY ASSURANCE

A. Installer: Company specializing in sheet metal installation with minimum three years documented experience in sheet metal panel work similar to that of this project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.

B. Protect stored materials from heat and direct sunlight.

C. Prevent contact with materials during storage which may cause discoloration or staining.

1.7 WARRANTY

A. Furnish manufacturer's non-prorated 20-year warranty of finish film integrity.

PART 2 PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary metal wall pamel materials and accessories from single source from single manufacturer.

B. Sustainability Requirements: See Division 1 for materials to comply with the Sustainability Requirements.

2.2 PREFINISHED SHEET METAL PANEL SYSTEM

A. Basis of Design Manufacturer: See Drawings.
   1. MBCI; FW-120-2 Panel, as Basis-of-Design.

B. Acceptable Manufacturers:
   1. Metl Span.
   2. Atas International Inc.
   3. Centria Architectural Systems.

C. Materials.
   1. Galvanized Steel: ASTM A653 G90 galvanized coating.

D. Exterior Flat Metal Panel:
   1. Description: 1-1/2-inch, 12-inch wide panel with 2 beads at 4-inches on center, fabricated from minimum 24 gauge core steel with ASTM A653 G90 galvanized coating; smooth surface, PVDF finish.
   2. Protective Backing Paint: Match exterior paint coating and color.
   3. Fasteners: Concealed.
   4. Finish: Manufacturer's standard 70% polyvinylidene fluoride (PVDF) resin.
   5. Color: See Drawings.

2.3 ACCESSORY MATERIALS

A. Trim color to match adjacent building fascia trim color.

B. Anchorage and support members: Minimum 18 gage galvanized steel sheet, brake formed to appropriate profiles.

C. Fasteners:
   1. Exposed Applications: Galvanized steel with soft neoprene washers, factory prefinished to match panel color.
   2. Nailers, Cleats, and Other Concealed Applications: Hot dip galvanized; sizes as recommended by the roofing materials manufacturer.
   3. Formed Closures: Closed cell neoprene or polyethylene foam; size and shape to match panel profile.

D. Sealant: As recommended by the manufacturer of the panel materials.

E. Touch-up Paint: Manufacturer's special color-matched material, formulated for retouching fluoropolymer or SMP finishes, as appropriate.

2.4 FABRICATION

A. Fabricate cleats and starter strips, if required, from minimum 20-gage galvanized steel sheet material, unless heavier gage recommended for application indicated.

B. Finishing: Apply in accordance with finish material manufacturer's requirements; apply strippable film for protection during shipping, fabrication and installation.

C. Cut and form in accordance with approved shop drawings, using recognized sheet metal practices. Perform cutting with clean, sharp properly aligned shearing tools; do not saw or file edges of sheets.

D. Form pieces in longest practical lengths.

E. Corners, Trim, Metal Closure Pieces, Caps, and Associated Flashing: Same material, thickness, and finish as metal panels; preformed to required angles and profiles, in accordance with the approved shop drawings.

2.5 PERFORMANCE

A. Sustainable Design Submittals: See Division 1 Sustainability Requirements for additional requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Verify that substrate is clean and dry, that joints in sheathing are solidly supported, and that sheathing is ready for installation of sheet metal panels.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

C. Verify that items required to penetrate siding and soffit panels are solidly set.

3.2 PANEL INSTALLATION

A. Perform metal panel work in accordance with panel system manufacturer's instructions.

B. Install building paper; weatherlap horizontal joints, 3 inches minimum.

C. Install starter strips, edge strips, flashings, and furring before starting installation of paneling and soffits.

D. Install each panel as a single continuous piece from top to bottom; securely anchor each panel at highest point; provide for thermal expansion and contraction at low points. Install flashings as required to preclude water penetration.

E. Conceal fasteners wherever possible.

F. Except as otherwise indicated, lap panel edges two flutes; seal or gasket all joints. Provide closures at panel ends only as necessary to prevent water infiltration. Except in plenum areas where louvers are indicated, install panels to provide ventilation of parapets.

END OF SECTION

SECTION 075000

MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Fully adhered membrane roofing system.

B. Principal Products:
   1. Membrane roofing.
   2. Roofing insulation.
   3. Cover board.
   4. Substrate board.
   5. Vapor barrier.
   6. Liquid flashing.
   7. Walkway pads.

C. Related Requirements:
   1. Section 061053: Miscellaneous rough carpentry.
   2. Section 076200: Sheet metal flashing and trim.
   3. Section 077100: Manufactured metal copings.
   4. Section 077200: Equipment support curbs.

1.2 REFERENCES

A. Definitions:
   1. Roofing Terminology: See ASTM D1079 and the NRCA Roofing and Waterproofing Manual glossary.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Agenda Items:
      a. Preparation procedures.
      b. Installation procedures.
      c. Testing procedures.
      d. Coordination and scheduling required with related Work.
      e. Protection of construction and site.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Roofing membrane and accessory products.
   2. Substrate board.
   3. Vapor retarders.
   4. Roof insulation and cover board.
   5. Roof walkway material.
   6. Initial selection color charts or Samples.

B. Shop Drawings: Include plans, elevations, sections, details, intersections with adjacent assemblies, terminations, and attachments, including:
   1. Base flashings.
   2. Membrane terminations.
   3. Flat and tapered insulation, including cants and slopes.

C. Samples:
   1. Membrane Sheet: 6 by 6 inch Sample of each type and color.
   2. Flexible walkway materials.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements:
   1. Installer: Manufacturer authorization.

B. Certificates: Manufacturer affidavit that Project design and conditions have been reviewed and that the installation will be fully warrantable if correctly installed. This submittal may be in the form of a photocopy of manufacturer authorization to Installer to proceed with installation.

C. ICC-ES test and evaluation reports for roofing system components.

D. Product Test Reports for roofing system components, performed or witnessed by a qualified testing agency.

E. Field Quality Control Submittals: Field test reports.

F. Manufacturer Reports: Field quality control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Roof system maintenance requirements.

B. Warranty Documentation: For complete roof system.

C. Project Plaque: Provide permanent sign or framed document with the following information attached to wall near primary access to main roof.
   1. Roofing installer name, address, and telephone number.

2. Roofing system manufacturer name, address, and telephone number.
3. Starting date of warranty and length of warranty period.

1.7 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturers: UL listed for roofing system.
2. Installer: Licensed, authorized, or approved by roofing manufacturer to install manufacturer roofing system and provide full specified warranty.
3. Infrared Roof Moisture Survey Technician: NDT test technician certified to Level 2 minimum in thermal/infrared test method per American Society for Nondestructive Testing Recommended Practice SNT-TC-1A.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: Store roofing system components protected from the elements, precipitation and standing water, freeze/thaw cycling, and protected from sunlight, if required.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within limitations recommended by manufacturer.

1.10 WARRANTY

A. Two (2) Year Workmanship Warranty:
1. The Contractor warrants to the Owner that all labor and workmanship performed in the installation of the TPO roofing system—specifically including substrate preparation, fastening patterns, and hot-air field welding of the seams—will be free from installation-related defects that result in water infiltration for a period of two (2) years from the Effective Date.
2. Remedy: If an installation or workmanship defect is discovered within this two-year period, the Contractor will, at its own expense, repair or replace the affected membrane area or seams to restore the system to a watertight condition.

B. Twenty (20) Year Roofing Assembly Warranty:
1. The Contractor warrants that the comprehensive TPO roofing assembly—including the premium 80-mil TPO membrane, insulation/cover boards, mechanical fasteners, plates, adhesives, flashing, and termination bars—will remain structurally sound, weather-tight, and free from material defects for a period of twenty (20) years from the Effective Date. This warrants that the component layers will perform reliably as a single cohesive unit to prevent water intrusion.
2. Remedy: In the event of an assembly failure or system leak resulting from defective components or system integration, the Contractor will repair or replace the necessary components of the assembly to restore structural integrity and weather-tightness.

C. Twenty (20) Year Membrane Degradation and UV Resistance Warranty:
   1. The Contractor warrants that the top-layer polymer formulation of the 80-mil TPO membrane will not prematurely crack, split, delaminate, or suffer accelerated erosion due to ordinary exposure to solar ultraviolet (UV) radiation or thermal stress for a period of twenty (20) years from the Effective Date. Because of the enhanced 80-mil thickness, the membrane surface is warranted to maintain superior core physical properties under continuous environmental exposure in accordance with ASTM D6878 industry standards.
   2. Remedy: If the TPO membrane fails due to premature weathering, UV degradation, or manufacturing defects within twenty years, the Contractor (cooperatively with the material manufacturer) will supply and install replacement membrane sheets or patches.

D. Accidental Puncture and Tear Coverage:
   1. In consideration of the installation of a heavy-duty 80-mil membrane, this warranty includes coverage for accidental punctures, cuts, or tears resulting from normal building maintenance and routine foot traffic (such as HVAC service technicians or window washers). This coverage is limited to a maximum aggregate total of [e.g., 5] accidental puncture repairs per calendar year, or a total repaired surface area not exceeding [X] square feet.
   2. Remedy: Upon prompt written notification of a leak caused by an accidental puncture, the Contractor will patch the punctured area at no labor or material cost to the Owner.

E. Mandatory Forty-Eight (48) Hour Notice Requirement:
   1. As a strict condition precedent to any coverage, liability, or remedy under this warranty—including the Accidental Puncture and Tear Coverage—the Owner must provide written notice to the Contractor of any leak, defect, or puncture within forty-eight (48) hours of its initial discovery. Failure to provide written notice within this 48-hour window shall completely invalidate and void the Contractor's obligations and liability for that specific occurrence or any resulting consequential damage.

F. General Exclusions and Limitations:
   1. This warranty does not cover damage caused by:
      a. Acts of God, including lightning, tornadoes, hurricanes, or hail impacts.
      b. Exposure to incompatible chemicals, oils, grease, or solvent spills not rated for TPO compatibility.
      c. Substrate or structural deck movement, settling, or structural failure of the building.
      d. Water ponding or prolonged standing water resulting from inadequate structural drainage or structural deflection.

PART 2 PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN, TPO, ROOFING

A. TPO Sheet: ASTM D6878, scrim or fabric internally reinforced, fabric backed.
   1. Manufacturers:
      a. Carlisle SynTec Incorporated.
      b. GAF Materials Corporation.
      c. GenFlex.

d. Holcim Elevate.
e. Johns Manville.
f. Versico.
2. Membrane Thickness: 80 mils.
3. Exposed Face Color: Architect selected.

2.2 COMPONENT MATERIALS

A. General: Provide components of roofing system recommended by manufacturer for a complete system.
1. Component materials are all compatible with each other and adjacent materials.

B. Adhesive: Manufacturer standard water based bonding adhesive.

C. Flexible Flashing: Same material as roofing membrane, manufacturer recommended thickness.

D. Slip Sheet: As recommended by manufacturer, of thickness required for application.

E. Lap Joint Sealant: Manufacturer standard, color to match membrane.

F. Butyl Mastic: Manufacturer standard water stop mastic.

G. Termination Bars: Manufacturer standard stainless steel, pre-drilled for included anchors.

H. Battens: Manufacturer standard, pre punched, steel sheet, with aluminum-zinc alloy or zinc coating.

I. Fasteners: Compliant with FM Global 4470 for corrosion resistance, including metal or plastic washers, and acceptable to roof system manufacturer.

J. Accessories: Miscellaneous flashing, reinforcing, sealants, and other accessories as recommended by manufacturer for a complete installation.
1. Colors: Match roofing membrane color.

2.3 SUBSTRATE BOARDS

A. Substrate Board: ASTM C1177, gypsum core, glass-mat facing, water-resistant.
1. Manufacturers and Products:
a. Georgia-Pacific Corporation DensDeck Prime.
b. National Gypsum Company Gold Bond eXP Extended Exposure Sheathing.
c. USG Corporation Securock Glass Mat Roof Board.
d. Or approved equal.
2. Thickness: 5/8 inch, Type X.

B. Fasteners: FM Global 4470 compliant for corrosion resistance, including metal or plastic washers.

2.4 VAPOR RETARDER

A. Self-Adhering Sheet Vapor Retarder: ASTM D1970, polyethylene film with rubber asphalt adhesive, slip resistant surface, and paper backing.
   1. Thickness: Minimum 30 mils.
   2. Permeance: 0.1 perm, maximum.
   3. Manufacturer may recommend priming with manufacturer standard primer.

2.5 ROOF INSULATION

A. General: Roof insulation, preformed boards, manufactured or approved by roof membrane manufacturer, manufacturer standard sizes, thicknesses as shown on Drawings and that produce FM Global approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 2, Grade 3.
   1. Manufacturers:
      a. Atlas Roofing Corporation.
      b. Carlisle SynTec Incorporated.
      c. GAF Materials Corporation.
      d. Holcim Elevate.
      e. Hunter Panels.
      f. Insulfoam LLC.
      g. Johns Manville.
      h. Rmax, Inc.
      i. Sika.
      j. Or approved equal.
   2. Thickness: 2.7 inches maximum per layer, 2-layers minimum.

C. Tapered Insulation: Factory formed, tapered insulation boards, 1/4 inch per foot slope or as shown on Drawings.

D. Special Shapes: Provide preformed insulation shapes to form crickets, saddles, tapers, and other shapes to facilitate drainage.

E. Fasteners: FM Global 4470 compliant for corrosion resistance, including metal or plastic washers.

F. Adhesive: Recommended by insulation manufacturer for adhering insulation layers together and insulation to substrate.
   1. Adhesive Types: Asphaltic, asbestos free, cold applied, Single- or multi-component urethane low-rise, apply in bead or full-spread as recommended by manufacturer.

2.6 COVER BOARDS

A. Water Resistant Gypsum Board: ASTM C1177 or ASTM C1278, 5/8 inch thick, factory primed.
   1. Manufacturers and Products:

a. Georgia-Pacific Corporation DensDeck Prime with Eonic Technology.
b. National Gypsum Company DEXcell FA Glass Mat Roof Board.
c. USG Corporation Securock Ultra-Light Coated Glass Mat Roof Board.

2.7 ASPHALT

A. Asphalt Primer: ASTM D41.

2.8 WALKWAYS

A. Flexible Walkways: Factory formed, heavy duty, solid rubber walkway pads, approved or acceptable to roof membrane manufacturer.
   1. Slip resistant.
   2. Texture: Manufacturer standard.
   3. Configuration: Walkway pads or rolls.
   4. Thickness: Approximately 3/16 inch thick.

B. Walkway Pads: ASTM D6164/D6164M, Type I or II, Grade G, SBS modified asphalt sheet; granule surfaced; manufactured by roof membrane system manufacturer.
   1. Size: 36 by 60 inches.
   2. Color: Architect selected.

2.9 PERFORMANCE

A. Accelerated Weathering: ASTM G152, ASTM G154 or ASTM G155; withstand 2,000 hours of testing.

B. Impact Resistance: ASTM D3746 or ASTM D4272.

C. Compatibility: Roof system materials are to be compatible within themselves and with all adjacent material as installed.

D. Roof System Design: Certified by testing to FM 4474, UL 580 or UL 1897 to resist uplift pressures as shown on Structural Drawings.
   1. Corners Zone 3: 135 lbf/ sq ft.
   2. Perimeter Zone 2: 105 lbf/ sq ft.
   3. Field Zone 1: 75 lbf/ sq ft.

E. FM Approvals Listing: Roofing system and components follow requirements of FM Global 4450 or FM Global 4470, and must be listed in FM Approvals RoofNav for Class 1 noncombustible construction. Materials are to retain FM Approvals markings.

F. Fire/Windstorm Classification: Class 1A-135.

G. Hail Resistance Rating: SH per FM Global Property Loss Prevention Data Sheet 1-34.

H. Exterior Fire Test Exposure: ASTM E108 or UL 790 testing by a qualified testing agency, Class A, products marked as compliant by testing agency.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine and verify conditions for compliance with roof system manufacturer recommendations:
   1. Substrate.
   2. Roof openings and penetrations.
   3. Curbs, nailers, and cants.

3.2 PREPARATION

A. Clean and prepare substrate per manufacturer written instructions.

B. Protect roof drainage and other equipment and surfaces from roofing materials.

3.3 ROOFING INSTALLATION - GENERAL

A. Complete terminations, flashings, roofing installation, and temporary measures by end of each workday and during rain events.

B. Tie in to Existing Roof Systems: Use only compatible materials, maintaining weathertight condition and existing warranties.

3.4 INSTALLATION - SUBSTRATE BOARD

A. Install substrate boards with long sides perpendicular to roof slopes in straight lines, stagger end joints. Install with tight butt joints.
   1. Fasten substrate board to top flanges of steel deck.
   2. Fasten substrate board to steel deck flanges per FM Global RoofNav and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.

3.5 INSTALLATION - VAPOR RETARDER

A. Self Adhering Sheet Vapor Retarder: Prime substrate. Install self adhering sheet vapor retarder in place; lap side seams minimum 3-1/2 inches and ends minimum 6 inches. Seal laps by rolling.

B. Install vapor retarder to provide complete seal against air movement at penetrations and terminations.

3.6 INSTALLATION - INSULATION

A. Do not allow insulation to be exposed to precipitation or left exposed at the end of the workday.

B. Install tapered insulation under area of roofing to conform to slopes shown on Drawings.

C. Install insulation to required thickness. Install in layers with joints staggered from previous layer 6 inches in each direction, minimum.

D. Install insulation with long sides in straight rows with end joints staggered between rows, butt joints at edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Fit insulation by trimming, within 1/4 inch of nailers, obstructions, and penetrations.
   2. Trim and fit insulation at roof drains.

E. Adhered Insulation: Install each layer of insulation adhered to substrate as follows:
   1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly press insulation in place.
   2. Set each layer of insulation in a uniform, full spread of insulation adhesive, firmly press insulation in place.
   3. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. Allow primer to dry.
   4. Set each layer of insulation in a full coverage mopped layer of hot roofing asphalt, applied within plus or minus 25 deg F of manufacturer recommended temperature.

F. Mechanically Fastened and Adhered Insulation: Mechanically fasten first layer of insulation to deck using mechanical fasteners designed and sized for fastening roof insulation to each deck type.
   1. Fasten first layer of insulation per FM Global RoofNav for specified Windstorm Resistance Classification.
   2. Fasten first layer of insulation to resist uplift pressure in field, corners, and perimeter of roof.
   3. Set each subsequent layer of insulation in ribbons of bead-applied adhesive, firmly pressing insulation in place.
   4. Set each subsequent layer of insulation in a uniform application of full-spread insulation adhesive, firmly pressing insulation in place.
   5. Set each layer of insulation in a full coverage mopped layer of hot roofing asphalt, applied within plus or minus 25 deg F of manufacturer recommended temperature.

3.7 INSTALLATION - COVER BOARD

A. Install cover boards over insulation with long sides in straight lines and end joints staggered between rows. Offset joints from insulation layer below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
   1. Fasten cover boards per FM Global RoofNav for specified Windstorm Resistance Classification.
   2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.8 INSTALLATION - ADHERED ROOFING MEMBRANE

A. Unroll roofing membrane and allow to relax before installing.

B. Start installation of roofing in presence of roofing system manufacturer technical personnel.

C. Align roofing to an accurate layout, maintaining side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing as recommended by manufacturer. Do not apply adhesive at splice areas of roofing.

E. Mechanically fasten adhered roofing securely at terminations, penetrations, perimeters and other areas shown.

F. Apply roofing with uphill side laps overlapping lower layers with slope of roof deck where possible.

G. Repair tears, voids, lapped seams, or defects in roofing that do not follow requirements.

H. Spread sealant or mastic bed over deck drain flanges at roof drains, and securely seal membrane roofing in place with clamping ring.

3.9 MEMBRANE SEAMING

A. Heat Welded Seam Installation: Heat weld seams using methods and equipment recommended by membrane manufacturer.

B. Leave seams uncovered until they are inspected by manufacturer technical representative.

3.10 INSTALLATION - BASE FLASHING

A. Adhere flashings and flashing accessories to substrates.

B. Apply adhesive to substrate and underside of sheet flashing, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field formed inside and outside corners per roofing manufacturer recommendations.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets per manufacturer requirements. Seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate using termination bars.

3.11 APPLICATION - PROTECTIVE COATING

A. Apply coatings to roofing and base flashings.

3.12 INSTALLATION - WALKWAYS

A. Flexible Walkways: Adhere walkway components to substrate with compatible adhesive.

3.13 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Inspections: Continuous during application.
   1. Substrate conditions.
   2. Substrate preparation.
   3. Vapor barrier application, if required.
   4. Membrane application.
   5. Flashings.
   6. Protection components.
   7. Penetrations and drainage components.
   8. Furnish reports to Architect.

C. Infrared Roof Moisture Survey: ASTM C1153. Ground-based, walk over type.
   1. Record entire survey and provide digital file to Owner with the report.
   2. Include in the report thermograms of all suspect areas and corresponding daytime photos of the same locations.
   3. Inspection to be conducted by an NDT test technician certified to at least Level 2 in Thermal/Infrared test method per American Society for Nondestructive Testing Recommended Practice SNT-TC-1A.
   4. Locate specific areas of leaks by electrical capacitance/impedance testing, ASTM D7954.

D. Electronic Leak Detection: ASTM D7877 and ASTM D8231. Engage testing agency to survey entire roof area and adjacent vertical surfaces for potential leaksusing one of the following methods:
   1. EFVM.
   2. Electric roller scanning platform.
   3. High voltage spark testing.

E. Final Roof Inspection: Arrange for roofing system manufacturer or testing agency to inspect completed roofing installation.
   1. After completing testing, repair leaks, then repeat tests.
   2. Continue to make further repairs until roofing and flashings are watertight.

F. Repair or remove and replace roofing system components that fail tests or do not follow requirements.

3.14 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period.

B. Sweep roof surface; remove loose fasteners, rocks, and other items that might damage membrane.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Counterflashing for membrane roof systems.
2. Counterflashing at roof mounted equipment and utility penetrations.
3. Roof drainage system flashing and components.

B. Principal Products:
1. Counterflashing.
2. Roof drainage components.
3. Leaf screen fabrications.
4. Miscellaneous flashing.

C. Related Requirements:
1. Section 075000: Membrane roofing.
2. Section 074113.16: Standing-seam metal roof panels.
3. Section 077100: Roof specialties .
4. Section 077200: Roof accessories.
5. Section 077233: Roof hatches.
6. Section 079200: Joint sealants.
7. Section 079500: Expansion control.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate Work results of this Section with roofing work.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Coil-coated sheet metal.
2. Initial selection color charts and Samples.

B. Shop Drawings.
   1. Show fabrication and profiles for each item.
   2. Show base metals, thicknesses, and finishes.
   3. Include attachment and connection details.
   4. Include details for corners, changes in plane, expansion joints, and terminations.
   5. Show locations of expansion joints.
   6. Roof Edge Fascia Trim: Include NRCA tested design information.

C. Samples:
   1. Gutters, Downspouts, and Copings: 12 inch lengths in required finish.
   2. Coil-Coated Trim and Prepatinated Copper: 12 inch long sections in required finish.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Certify copings and roof edge fascia trim are ANSI/SPRI/FM 4435 ES-1 tested.
   2. Certify low-slope roof gutters are SPRI GT-1 tested.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Coil-coated sheet metal finish, Roof edge warranty, and Coping warranty.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Coping and Roof Edge Fabricators: Listed by UL, FM, or other agency acceptable to authority having jurisdiction to fabricate copings, roof edge fascia, and gutters per NRCA tested designs to meet ANSI/SPRI/FM 4435 ES-1 securement requirements.
   2. Gutter Fabricators: Listed by UL, FM, or other agency acceptable to authority having jurisdiction to fabricate gutters per NRCA tested designs to meet SPRI GT-1 securement requirements.

B. Field Samples: Construct sheet metal fabrications 36 inches in length, minimum size. Demonstrate texture, color, and pattern.

C. Mockups: Provide sheet metal fabrications for exterior wall mockup assemblies.
   1. Approved mockups establish product quality and work results standard.
   2. Laboratory Mockup Testing: Test copings and roof edge fascia trim. Complete testing 30 days, minimum, before scheduled field installation.
      a. Roof Edge Securement: Test per ANSI/SPRI/FM 4435 ES-1.
      b. Gutters: Test per SPRI GT-1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store sheet metal elevated above grade, protected from precipitation and stormwater runoff.
   2. Handle fabrications to prevent twisting, bending, and abrasion.
   3. Prevent contact with materials causing discoloration or staining.

1.8 WARRANTY

A. Include roof edges, coping, gutters, and downspouts in warranty for roofing system specified in Section 075000, 077100, and 077233.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: Less than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: 20 years.

C. Installer Warranty:
   1. Sheet Metal Fabrications: Warrant against installation failure.
      a. Failure includes damage by wind under stated design wind speed or thermal movement.
   2. Warranty Period: 2 years.

PART 2 PRODUCTS

2.1 PERFORMANCE

A. Design Wind Load Criteria: See Structural Drawings.

B. Environmental Performance:
   1. Expansion and Contraction: Withstand thermal cycling over 120 degrees F ambient and 180 degrees F on material surfaces.

2.2 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy and temper required for use and finish.
   1. Finish: Three coat fluoropolymer.
   2. Coil-Coating Color: Architect selected ; custom ; non-metallic.

B. Stainless Steel Sheet: ASTM A240; Type 304 and 316, dead soft fully annealed.
   1. Surface: Smooth.
   2. Finish: No. 4.

2.3 ACCESSORIES

A. Fasteners for Aluminum: Stainless steel, Type 316 , with soft neoprene washers where exposed.

B. Fasteners for Metals Other Than Aluminum: Same material and finish as item being fastened, with soft neoprene washers where exposed.

C. Solder: ASTM B32; type suitable for application and material being soldered.

D. Synthetic Underlayment: Manufactured roof underlayment sheets meeting ICC-ES AC188 acceptance criteria. Supply recommended fasteners.
   1. Manufacturers and Products:
      a. GCP Applied Technologies TRI-FLEX XT.
      b. Or approved equal.
   2. Locations:
      a. Areas in contact with TPO roofing.

E. Waterproof Underlayment: Self-adhered sheets manufactured to withstand high temperature below metal components; minimum 30 mils thick. Supply recommended primer.
   1. Manufacturers and Products:
      a. Henry Blueskin PE200 HT.
      b. Or approved equal.
   2. Application Notes:
      a. High-Temperature Synthetic Underlayment: Polypropylene or polyethylene-based products engineered for standing seam assemblies.
      b. Self-Adhering Membrane for Critical Areas: Rubberized asphalt or modified butyl membranes applied at eaves, valleys, and penetrations to create vapor-impermeable barriers in vulnerable regions.
   3. Locations:
      a. Areas below stainless steel or aluminum flashing and trim.
      b. Do not place in areas that contact TPO roofing.

F. Slip Sheet: Rosin-sized building paper.

G. Concealed Sealant: Butyl, ASTM C1311.
   1. Manufacturers and Products:
      a. Pecora BA-98.
      b. Tremco Butyl Sealant.

H. Exposed Sealant: See Section 079200.

I. Separation Coating: Bituminous paint; SSPC-Paint 12.

J. Plastic Cement: ASTM D4586, Type I.

K. Surface-Applied Reglets: Extruded aluminum with bottom edge drip and top edge sealant recess. Supply with stainless steel screws with neoprene washers and anchorage devices appropriate to substrate.

L. Splash Pads: Precast concrete; minimum 3,000 psi compressive strength; minimum 5 percent air entrainment.

2.4 FABRICATION

A. Fabrication Reference Standards:
   1. SMACNA Architectural Sheet Metal Manual.
   2. Copper Development Association Handbook.
   3. NRCA Roofing Manual.

B. Form section shapes shown on Drawings, accurate in size, square, and free from distortion or defects.

C. Fabricate cleats of same material as sheet metal, interlocking with sheet.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Moving Joints: Sealed; lapped, bayonet-type, or interlocking hooked seams.

F. Non-Moving Joints: Sealed watertight.

G. Fabricate corners, plane changes, and terminations in shop with minimum 18 inch legs.

H. Counterflashing:
   1. Material:
      a. Stainless Steel: SMACNA recommended and 0.019 inch minimum thickness.
   2. Fabricate to extend minimum 4 inches over protected construction, with hemmed bottom drip edge.
   3. Shop fabricate interior and exterior corners.

I. Gutters: Hanging; test per SPRI GT-1 at low-slope roof edges.
   1. Material:
      a. Aluminum: SMACNA recommended and 0.040 inch minimum base metal thickness.
   2. Profile: See Drawings.
   3. Expansion Joints: Maximum 50 feet on center.
   4. Expansion Joints: Midway between downspouts.
   5. Outlets: Beehive strainers of stainless steel wire.
   6. Supports: Brackets or Straps.

J. Downspouts:
   1. Material:
      a. Aluminum-Zinc-Coated Steel; SMACNA recommended and 0.040 inch minimum base metal thickness.
   2. Profile: See Drawings.
   3. Supports: Straps spaced maximum 5 feet on center, same metal as downspouts.

K. Roof Edge Fascia Trim: Fabricate per NRCA tested designs to meet ANSI/SPRI/FM 4435 ES-1 securement requirements.
   1. Material:
      a. Aluminum-Zinc-Coated Steel; SMACNA recommended and 0.040 inch minimum base metal thickness.
   2. Length: 8 to 12 feet long units.
   3. Joints: Butt joints with 6 inch concealed backing plate.
   4. Scuppers: Fabricate fascia with scuppers that extend 4 inches beyond fascia, with hemmed drip edge.
   5. Profiles: See Drawings.

L. Copings: Fabricate per NRCA tested designs to meet ANSI/SPRI/FM 4435 ES-1 securement requirements.
   1. Material:
      a. Aluminum: SMACNA recommended and 0.050 inch minimum base metal thickness.
   2. Length: 8 to 12 feet long units.
   3. Joints: Butt joints with 12 inch concealed backing plate.

M. Roof Drain Flashing:
   1. Material:
      a. Stainless Steel: SMACNA recommended and 0.022 inch minimum thickness.

2.5 FINISHES

A. Aluminum Color Coating: Two coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that roof openings, penetrations, and curbs through roof are solidly set, reglets in place, and nailing strips located.

B. Verify that roofing base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Paint concealed uncoated metal surfaces with 15 mil minimum thickness separation coating.

3.3 INSTALLATION

A. Installation Reference Standards:
   1. SMACNA Architectural Sheet Metal Manual.

2. Copper Development Association Handbook.
3. NRCA Roofing Manual.

B. Install flashing with concealed fasteners.

C. Secure fabrications with concealed fasteners where possible.

D. Apply plastic cement between metal and bituminous materials.

E. Separate dissimilar metals with separation coating or non-absorptive gaskets.

F. Underlayment:
1. Synthetic: Install and adhered according to manufacturer instructions.
2. Self-Adhered: Prime surfaces and install according to manufacturer instructions.

G. Slip Sheet: Apply on top of underlayment prior to installing sheet metal flashing work.

H. Expansion Joints for Sheet Metal Flashing and Trim: Provide pre-cured silicone flashing tape or EPDM strip flashing with bond breaker tape over the seam to accommodate metal thermal movements.

I. Counterflashing: Install counterflashing in contact with base flashing.
1. Anchor counterflashing in reglets with wedges and apply sealant to joint per Section 079200.
2. Drill counterflashing installed with surface mounted reglets so that anchorage fasteners go through the sheet metal. Apply sealant to back side of top edge and fasten reglet to wall construction. Apply sealant to top edge per Section 079200.
3. Lap ends of counterflashing 6 inches, minimum.

J. Secure gutters in place and install end caps with sealed joints. Install strainers in outlets.

K. Install downspouts plumb; anchored maximum 5 feet on center and within 2 feet of elbows and ends.
1. Connect downspouts to underground drain piping with watertight joints.
2. Where downspouts discharge to grade and roof surface provide splash pads.

L. Parapet Scuppers: Anchor securely in place and seal flanges watertight to wall face and to roof base flashing.

M. Edge Fascia Trim: Coordinate installation with roofing system to provide watertight protection for wall.
1. Install trim in straight lines with accurately aligned profiles.
2. Apply sealant to both edges of backing plates at joints.
3. Install anchorage base and cleats with screws.
4. Install fascia with continuous cleat.
5. Install covers with full engagement of anchorage cleats and uniform joint width.

N. Copings: Coordinate installation with roofing system to provide watertight protection for wall.
1. Install copings in straight lines with accurately aligned profiles.

2. Apply sealant to both edges of backing plates at joints.
3. Install anchorage base and cleats with screws.
4. Install outer edge with continuous cleat.
5. Install covers with full engagement of anchorage cleats and uniform joint width.

3.4 CLEANING

A. Remove soiling, stains, and hand prints.

END OF SECTION

SECTION 077100

ROOF SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Roof perimeter edge systems.
2. Parapet facing.

B. Principal Products:
1. Manufactured coping system.
2. Manufactured edge trim.
3. Metal Perimeter blocking system.
4. Metal parapet panel.

C. Related Requirements:
1. Section 074113.16: Standing-seam metal roof panels.
2. Section 075000: Membrane roofing.
3. Section 076200: Sheet Metal Flashing and Trim for shop fabricated metal flashing and roof gutters and downspouts.
4. Section 077200: Roofing accessories.
5. Section 079200: Joint sealants.
6. Section 079500: Expansion control.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate work results of this Section with roofing and wall air and water barrier membrane for continuity of protection against water and air infiltration.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting in conjunction with roofing preinstallation meeting.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Manufactured coping system; include factory-fabricated termination and transition shapes.
2. Manufactured edge securement trim for low-slope roofing; include factory-fabricated termination and transition shapes.

3. Initial selection color charts.

B. Shop Drawings: Show profiles and dimensions, joining methods, accessory item locations, anchorage and flashing details, and adjacent construction interfaces.

C. Samples: Specified metal and finish.
1. Coping Covers: 12 inches long, minimum.
2. Edge Securement Trim: 12 inches long, minimum.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer test results showing wind uplift resistance as tested per ANSI/SPRI/FM 4435 ES-1.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty documentation.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Coping and Roof Edge Manufacturers: Listed by UL, FM, or other agency acceptable to authority having jurisdiction to fabricate per NRCA tested designs to meet ANSI/SPRI/FM 4435 ES-1 securement requirements.
2. Installer Qualifications: Section 074113.16 and 075000 roofing system installer.

B. Mockups: Provide components for exterior wall mockup assemblies.
1. Approved mockups establish work results standard.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prevent deformation, abrasion, and other damage during handling and installation.

B. Remove strippable finish protection film when recommended by manufacturer.

1.8 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Include roof specialties in roof system warranty specified in Sections 074113.16 and 075000.

B. Manufacturer Warranty: Warrant against product and installation failure.
   1. Failure includes products blowing off, deforming, leaking, or causing membrane roofing failure when exposed to specified wind conditions.
   2. Warranty Period: 20 years.

C. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: Less than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling, or checking.
   2. Warranty Period: 20 years.

PART 2 PRODUCTS

2.1 MANUFACTURED ROOF EDGE SYSTEMS

A. Roof Edge Requirements: Engineered systems tested per ANSI/SPRI/FM 4435 ES-1 for roofing securement.

B. Manufactured Coping System: Snap-on cover with concealed gasketed splice plates that accommodate thermal movement and drain water out of system; no exposed fasteners.
   1. Manufacturers:
      a. ATAS International.
      b. Carlisle Drexel Metals.
      c. Hickman Edge Systems.
      d. Metal-Era.
      e. Petersen PAC-CLAD.
      f. SAF Perimeter Systems.
   2. Configuration: Full width of wall.
   3. Cover Material: Aluminum sheet, smooth finish.
   4. Aluminum Cover Thickness: 0.040 inch.
   5. Cover Finish: PVDF coil coating.
      a. Color: Architect selected.
   6. Cover Profile: See Drawings.
   7. Cover Face: Drip edge.
   8. Cover Dimensions: See Drawings.
   9. Securement: Continuous cleats.
   10. Anchorage Fasteners: Stainless steel screws.
   11. Accessories: Factory fabricated units for terminations and changes in direction or plane.

C. Manufactured Roof Edge Trim: Snap-on cover with concealed gasketed splice plates that accommodate thermal movement and drain water out of system; no exposed fasteners.
   1. Manufacturers and Products:

a. ATAS International.
b. Carlisle Drexel Metals.
c. Hickman Edge Systems.
d. Metal-Era.
e. Petersen PAC-CLAD.
f. SAF Perimeter Systems.

2. Profile: See Drawings.
3. Cover Material: Aluminum sheet, smooth finish.
4. Aluminum Cover Thickness: 0.040 inch.
5. Cover Finish: PVDF coil coating.
   a. Color: Architect selected.
6. Cover Dimensions: See Drawings.
7. Securement: Continuous cleats.
8. Anchorage Fasteners: Stainless steel screws.
9. Accessories: Factory fabricated units for terminations and changes in direction or plane.

2.2 PIPE PENETRATION BOXES

A. Pipe Penetration Boxes: Insulated waterproofing aluminum housings with pipe penetrations.
   1. Manufacturers and Products:
      a. Roof Penetration Housings Roof VAULT.
      b. Or approved equal.
   2. Construction Aluminum welded body with powder coating.
   3. Penetration Configuration: As required for watertight installation with multiple penetrations.

2.3 PERFORMANCE

A. Structural Loads: See Structural Drawings.

B. Environmental Performance:
   1. Expansion and Contraction: Accommodate 180 degree F surface and 120 degree F ambient temperature differential without failure.

2.4 FINISHES

A. Aluminum Color Coating: Two coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.
   1. Color: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify wood blocking for support and anchorage is positioned correctly, securely fastened, level, and in plane.

B. Verify installation surfaces are clean, dry, and free of foreign matter.

C. Verify wall air barrier membrane extends under roof membrane flashing on the anchorage blocking.

D. Verify roof membrane flashing extends over anchorage blocking and is securely fastened to the blocking.

3.2 INSTALLATION

A. Install roof specialties to provide weatherproof performance and prevent water intrusion into building enclosure elements or interior.

B. Copings:
1. Install copings in straight lines with accurately aligned profiles.
2. Install anchorage base and cleats with screws.
3. Install splice plates with continuous gaskets that prevent lateral movement of water to void below cover.
4. Install covers with full anchorage cleat engagement and uniform joint width.

C. Edge Securement Trim:
1. Install trim in straight lines with accurately aligned profiles.
2. Install anchorage base and cleats with screws.
3. Install splice plates with continuous gaskets that prevent lateral movement of water to void below cover.
4. Install covers with full anchorage cleat engagement and uniform joint width.

3.3 PROTECTION

A. Protect roof specialties from foot traffic and damage.

3.4 CLEANING

A. Remove soiling and stains from installed components.

END OF SECTION

SECTION 077200

ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Accessories installed on or in roofing.

B. Principal Products:
1. Equipment support curbs.
2. Pipe penetration boxes and boots.
3. Roof vents.
4. Roof equipment screens.

C. Related Requirements:
1. Section 074113.16: Standing-seam metal roof panels.
2. Section 075000: Membrane Roofing.
3. Section 076200: Sheet Metal Flashing and Trim for shop fabricated metal flashing and roof gutters and downspouts.
4. Section 077100: Roof specialties.
5. Section 077233: Roof hatches for roof hatches and metal safety railings and gate.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate roof accessories with roofing installation.

B. Preinstallation Meeting Attendees and Procedures:
1. Require roof accessory installer to attend roofing system preinstallation meeting.

1.3 ACTION SUBMITTALS

A. Product Data: Each roof accessory type and size.
1. Mounting type, materials, and hardware.
2. Initial selection color charts.

B. Shop Drawings: Plans, elevations, and attachment details.

C. Delegated-Design Submittal: For roof curbs and equipment supports 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. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
   2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Florida product approval.

B. Test and Evaluation Reports: Manufacturer and Independent testing agency test results showing:

C. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Warranty Documentation: For equipment support curbs, relief vents, equipment screens, and pipe penetration boxes.

1.6 WARRANTY

A. Manufacturer Warranty:
   1. Warrant roof hatches against product failure.
      a. Warranty Period: 5 years.
   2. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
      a. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
         1) Color fading more than 5 Delta E units when tested according to ASTM D2244.
         2) Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
         3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
      b. Finish Warranty Period: 20 years from date of Substantial Completion.
   3. Warrant pipe penetration boxes against product failure.
      a. Warranty Period: 20 years.

PART 2 PRODUCTS

2.1 ROOF ACCESS HATCHES

A. See Section 077233 "Roof Hatches" for project requirements.

2.2 EQUIPMENT SUPPORT CURBS

A. Equipment Supports: Insulated prefabricated roof curbs.
   1. Manufacturers and Products:
      a. Custom Curb.
      b. Thybar.
      c. Roof Products & Systems.
   2. Curb Profile: Manufacturer standard compatible with roofing system.
   3. Insulation: Factory-insulated 1-1/2-inch thick glass-fiber board insulation.
   4. Liner Sheets: Same material as curb, manufacturer standard thickness and finish.
   5. Nailers: Factory installed wood nailer along curb top flange, continuous around curb perimeter.
   6. Metal Counterflashing: Manufacturer standard; match curb metal and finish.
   7. Height: See Drawngs above roof membrane, minimum.
   8. Length: See Drawings.
   9. Material: Galvanized or aluminum-zinc alloy coated steel.
   10. Finish: Powder coating.
      a. Color: Architect selected.

2.3 RELIEF VENTS

2.4 ROOF EQUIPMENT SCREENS

A. Roof Equipment Screens: Structure and panel system for roof equipment visual screening.
   1. Manufacturers and Products:
      a. Architectural Louvers Louvered Roof Equipment Screens.
      b. CityScapes Envisor.
   2. Mounting: Equipment supported; coordinate with equipment manufacturer.
   3. Support Structure: Aluminum; sized by manufacturer for wind loads per Structural drawings.
   4. Panel Style: Architect selected.
   5. Panel Material:, Architect selected.
   6. Equipment Access: Equipment screen manufacturer standard 180 degree swinging panel system.
   7. Aluminum Panel Finish: Architect selected.
      a. Color: Architect selected.

2.5 PIPE PENETRATION BOXES AND BOOTS

A. Pipe Penetration Boxes: Insulated waterproof aluminum housing for multiple pipe penetrations.
   1. Manufacturers and Products:
      a. Alta Products Sigrist Pipe Chase Housing and Exit Seals.
      b. The Pate Company Pipe Hoods.
      c. Roof Penetration Housings AWI Vault and Exit Seals.
   2. Construction: Aluminum welded body with powder coating.
   3. Configuration: As required for watertight installation with multiple penetrations.

B. Pipe Boots: Formed aluminum flange and sleeve with collared opening and graduated boot cap with stainless steel clamps.
   1. Manufacturers and Products:
      a. Portals Plus.
      b. Roof Products & Systems.
   2. Cap Material: Match roofing membrane type.
   3. Configuration: Single pipe or Multiple pipes , with premanufactured curb.
   4. Color: Manufacturer standard.

2.6 PERFORMANCE

A. Structural Loads: See Drawings and Applicable code compliant.

B. Hurricane Zone: Full assembly.
   1. Florida Product Approval: Outside High Velocity Hurricane Zone.

C. Environmental Performance:
   1. Expansion and Contraction: Withstand 120 degree F ambient and 180 degree F surface thermal cycling without failure.

2.7 INSTALLATION MATERIALS

A. Protective Coating: Bituminous, ASTM D1187, Type I or II.

B. Anchorage Fasteners: Stainless steel screws.

2.8 FABRICATION

A. Fabricate curbs for 12 inch height above roof surface.

B. Where deck slope exceeds 1 to 48, fabricate tapered curbs to provide level lid.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that deck surfaces and roof openings are ready to receive Work of this Section.

3.2 PREPARATION

A. Apply protective coating on aluminum surfaces contacting cementitious materials, wood, and dissimilar metals.

B. Clean and prepare substrates for snow guards.

3.3 INSTALLATION

A. Set curbs in full contact with roof deck.

B. Anchor roof accessories to resist specified loads.

C. Attach safety railings securely to hatch curbs.

D. Attach safety posts to roof access ladders.

E. Lubricate and adjust hardware for smooth, accurate operation.

F. Anchor pipe penetration boxes and boots rigidly and securely. Install with flanges fully supported on structural deck.

G. Touch up damaged factory-applied finishes.

3.4 CLEANING

A. Cleaning: Remove soiling and stains.

END OF SECTION

SECTION 077233

ROOF HATCHES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Roof hatches.
2. Safety railing and gate.
3. Supplementary components and accessories normally furnished or otherwise necessary for a complete installation, whether or not such items are included in the Specifications or indicated on the Drawings.

B. Related Requirements:
1. Section 055000 - Metal Fabrications.
2. Section 055213 - Pipe and Tube Railings for safety railing systems not attached to roof-hatch curbs.
3. Section 076200 - Sheet Metal Flashing and Trim for counterflashing roof hatch flashing.
4. Section 079200 - Joint sealants.
5. Section 099000 - Painting for field painting.

1.2 REFERENCES

A. Abbreviations and Acronyms:
1. NAAMM: National Association of Architectural Metal Manufacturers.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 SUBMITTALS

A. Action Submittals:
1. Product Data: For each type of roof hatch.
a. Include construction details, material descriptions, dimensions of individual

components and profiles, and finishes.

2. Shop Drawings: For roof hatches.
   a. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
3. Delegated-Design Submittal: For roof curbs and equipment supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   a. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
   b. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

B. Informational Submittals:
   1. Sample Warranties: For manufacturer's special warranties.

C. Closeout Submittals:
   1. Operation and Maintenance Data: For roof hatches to include in operation and maintenance manuals.

1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof hatches 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.
   1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
   2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified

professional engineer, using performance requirements and design criteria indicated.

C. Roof Hatch:
1. Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
2. Cover: Reinforced to support minimum live load of 40 psf with maximum deflection of 1/150th of the span or 20 psf wind uplift.
   a. Cover operation shall be smooth and easy with controlled operation throughout entire arc of opening and closing.
   b. Cover operation shall not be affected by temperature.
3. Provide weathertight unit with fully welded corner joints on cover and curb.

D. Wind-Restraint Performance: As indicated on Drawings.

E. Safety Railing OSHA Compliance: Provide hatch safety railing system as required by OSHA Standard 1910.23 and 1910.27 and as specified.
1. Top Rail Height: 42 inches +/-3 inches above finished roof deck.
2. Top-Mid Rail Spacing: 21-inch diameter maximum.
3. Meets 200 lbs. deflection load when mounted to roof hatch counterflash.
4. Upright post maximum spacing of 8 feet.

2.2 ROOF HATCHES

A. Roof Hatches: Metal thermally broken roof-hatch units with lids and single walled curbs, single-leaf metal lid for ladder access, and energy efficiency with a cover and curb design to minimize heat transfer between interior and exterior metal surfaces.
1. Manufacturers:
   a. Basis-of-Design Manufacturer: Design is based on products by the following.
      1) Nystrom, Inc.; ThermalMAX Roof Hatch.
   b. Acceptable Manufacturers: Subject to compliance with the Contract Documents, acceptable comparable manufacturers include the following.
      1) Babcock-Davis.
      2) The Bilco Company.
      3) J.L. Industries, Activar Construction Products Group.

B. Product: Model “RHTA” single-leaf lid, ladder access.
1. Size: 36 inches by 36 inches.

C. Loads: At least 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Thermally broken, aluminum sheet.
1. Thickness: 0.0907 inch (11 gauge).
2. Finish: Mill.

E. Construction:
1. Cover and Curb Insulation: Polyisocyanurate foil-faced board, 3 inches thick.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.

3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. Fabricate curbs to height of at least 12 inches above roofing surface unless otherwise indicated.

F. Hardware: Spring operators, hold-open arm, stainless steel spring latch with turn handles, stainless steel pintle-type hinge system, and padlock hasps inside and outside.

G. Hatch Mounted Safety Railing and Gate.
1. Safety Railings: Hatch manufacturer standard or recommended system, sized to fit hatch, 29 CFR 1910.29 compliant.
   a. Basis-of-Design Manufacturer and Product:
      1) Nystrom; Safety Railing System, Model SRC.
   b. Posts and Rails: 1-1/2 inch outside diameter, 42 inch overall height above roof surface.
   c. Construction: Aluminum; pipes or tubes.
   d. Gate: Hinged, self closing and self latching.
   e. Gate Hardware: Corrosion resistant hinges and latching mechanism.
   f. Mounting Hardware: Corrosion resistant type for attachment to curb without penetrating roof membrane.
2. Performance: Engineered and tested by manufacturer.
   a. Top Rail Concentrated Load: 200 pounds applied at any point in any direction.
   b. Top and Intermediate Rail Uniform Load: 50 plf applied in any direction.
   c. Concentrated and uniform loads need not be assumed to act concurrently.
3. Finish: Safety yellow powder coating.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
1. Basis-of-Design Manufacturer and Product:
   a. Nystrom; Ladder-Assist Post, Model SP.
   b. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
   c. Post: Aluminum pipe 1-1/2 inch diameter.
   d. Height: 42 inches above finished roof deck.
   e. Material: Aluminum.
2. Finish: Manufacturer's standard baked enamel or powder coat.
   a. Color: “Yellow”.

I. Safety Grab Bar:
1. Basis-of-Design Manufacturer and Product:
   a. Nystrom; Safety Railing System, Model SGB.
   b. Operation: mounts through a corner section through the curb counterflashing.
   c. Material: Aluminum pipe 1-1/4 inch inside diameter.
      1) Fittings: Cast aluminum alloy with set screw hold.
      2) Hardware: Hex head bolts 3/8 inch by 3/4 inch.
2. Finish: Safety yellow powder coating.

2.3 METAL MATERIALS

A. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
   1. Mill Finish: As manufactured.
   2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Steel Shapes: ASTM A 36, hot-dip galvanized according to ASTM A 123 unless otherwise indicated.

C. Steel Tube: ASTM A 500, round tube.

D. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123.

E. Steel Pipe: ASTM A 53, galvanized.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

C. Underlayment:
   1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
   2. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
      a. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 or ASTM F 2329.

D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Field-Finishing: In accordance with Section 09 96 00 High-Performance Coatings.
   1. Color: As selected by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify locations, dimensions, and other conditions affecting performance of the work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   2. Verify dimensions of roof openings for roof hatches.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof hatches according to manufacturer's written instructions.
   1. Install roof hatches level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
   2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
   3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
   4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by permanent separation as recommended by manufacturer.
   1. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

C. Roof-Hatch Installation:
   1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
   2. Attach safety railing system to roof-hatch curb.
   3. Attach ladder-assist post according to manufacturer's written instructions.

D. Seal joints with butyl sealant as required by roof hatch manufacturer.

3.3 REPAIR AND CLEANING

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

B. Clean exposed surfaces according to manufacturer's written instructions.

C. Clean off excess sealants.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 078100

APPLIED FIRE PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Interior cementitious fireproofing applied to structural steel and metal deck.

B. Principal Products:
   1. Low Density Gypsum SFRM sprayed fire resistive materials.
   2. Installation accessories.

C. Related Requirements.
   1. Section 018113: Sustainable design requirements.
   2. Section 057000: Column covers.
   3. Section 078123: Intumescent fire protection.
   4. Section 078400: Firestopping.

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. SFRM: Sprayed fire resistive materials.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate SFRM with installation of items attached to structural members.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Agenda Items:
      a. Review designs and fire ratings.
      b. Review scheduling tests and inspections.

C. Sequencing Procedures:
   1. Sequence Work in conjunction with placement of ceiling hanger tabs, partition track, and mechanical and electrical components.

D. Scheduling Procedures:
   1. Schedule SFRM before ducts, piping, equipment, and other items interfering with application of fireproofing.
   2. Schedule SFRM after concrete topping and roofing completed on metal decks.

1.4 SUSTAINABILITY REQUIREMENTS

A. General Sustainability Requirements:
   1. The Owner requires the Contractor to implement practices and procedures to meet the Project's environmental performance goals, which include achieving LEED v4 Certification.
      a. Refer to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS for the Project's target certification level and specific LEED requirements.
      b. The Contractor shall ensure that the requirements related to the Project's sustainability design goals are implemented to the fullest extent.
      c. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the Project's sustainability goals and LEED certification.

1.5 ACTION SUBMITTALS

A. Product Data:
   1. SFRM.
   2. Accessory materials.

B. Shop Drawings.
   1. Framing Plans: Show testing agency design number, fire rating, product, and material thickness.
   2. Details: Show interfaces between SFRM and construction specified in other sections.

C. Schedule of Applications: Indicate testing agency designs, SFRM material and thicknesses, and field test acceptance criteria.

1.6 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Manufacturer product certificates.

B. Test and Evaluation Reports: Manufacturer and Independent testing agency test results showing products follow requirements.

C. Manufacturer Instructions.

D. Field Quality Control Submittals: Field [test] and [inspection] reports.

E. Manufacturer Reports: Field instruction, test, and inspection reports.

F. Qualification Statements: Manufacturer, Fabricator, Installer, and Testing agency.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer trained and certified.
   2. Testing Agencies: Acceptable to authorities having jurisdiction.

B. Certifications: From Contractor for specified performance.

C. Field Samples: Apply each SFRM to each required substrate. Demonstrate texture and thickness.
   1. Linear Members: 10 feet long sample.
   2. Steel Decking: 100 square feet sample.
   3. Field Sample Testing: Test for compatibility with substrates.
      a. Bond Strength, per ASTM E736.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store applied fire protection products indoors, protected from elements and secured from theft.
   2. Store applied fire protection products elevated above grade, protected from precipitation and stormwater runoff.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Ambient and Substrate Temperature: 40 degrees F, minimum and rising.
   2. Provide and maintain temporary heat 24 hours before and after application.

PART 2 PRODUCTS

2.1 FIRE-RESISTANCE-RATED ASSEMBLIES

A. Fire Rated Designs: Tested per ASTM E119 or UL 263. See Drawings for assemblies.

2.2 LOW DENSITY SFRM

A. Low Density Gypsum SFRM: Factory mixed, wet applied, gypsum cement and aggregate formulation.
   1. Manufacturers and Products:
      a. GCP Applied Technologies Monokote MK-1000 HB.

b. Isolatek CAFCO 3000.
2. Flame Spread Index: 10, maximum; ASTM E84.
3. Smoke Developed: 10, maximum; ASTM E84.
4. Bond Strength: 1000 lbf/sq.ft, minimum; ASTM E736.
5. Density: 15 lb/cu. ft., minimum; ASTM E605.
6. Air Erosion: 0.025 g/sq. ft., maximum weight loss in 24 hours; ASTM E859.

2.3 INSTALLATION MATERIALS

A. General: SFRM manufacturer recommended materials that follow or are required by tested assembly.

B. Metal Lath: ASTM C847 expanded metal lath; 3.4 lb/sq ft, galvanized finish.

C. Overcoat and Sealer: SFRM manufacturer recommended.

D. Water: Potable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Surfaces are ready to receive SFRM.
1. Allow Owner special inspectors to perform preinstallation inspections per Field Quality Control article.

B. Verify clips, hangers, supports, sleeves, and other items required to penetrate SFRM are in place.

C. Verify voids and cracks in substrate have been filled. Verify projections have been removed where SFRM will be exposed to view as finish material.

D. Verify roof traffic has ceased and roof mounted equipment is in place.

3.2 PREPARATION

A. Perform adhesion tests per SFRM manufacturer when substrate acceptability is questionable.

B. Surface Preparation:
1. Remove incompatible materials affecting SFRM substrate bond.
2. Apply SFRM manufacturer recommended bonding agent on primed steel.

C. Protect adjacent Work from SFRM contamination.

D. Close off and seal ductwork before applying SFRM.

3.3 APPLICATION - SPRAY-ON FIREPROOFING

A. Install metal lath over structural members shown on Drawings or as required by fire rated assembly design.

B. Apply primers, SFRM and overcoat or sealer.

C. SFRM Thickness: Sufficient to achieve fire ratings.

D. Exposed SFRM:
   1. Roll sprayed surface to remove drippings and excessive roughness.
   2. Apply sealer with uniform coverage.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Tests and Inspections: Location and frequency per applicable code.
      a. Surface Preparation: Visual inspection.
      b. Thickness: ASTM E605, minimum per IBC.
      c. Density: ASTM E605, minimum as specified.
      d. Bond Strength: ASTM E736, minimum as specified.
      e. Finished Application: Visual inspection.
   2. Do not begin subsequent construction until inspectors have verified compliance of materials.

B. Non Conforming Work: Remove and replace, and retest.

C. Prepare test and inspection reports.

3.5 CLEANING

A. Remove SFRM overspray. Clean contaminated surfaces.

3.6 PROTECTION

A. Prevent SFRM damage.

B. Repair damage before concealing SFRM.

END OF SECTION

SECTION 078413

PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Application of Penetration of Firestopping.

B. Principal Products:
   1. Penetration firestopping systems.
   2. Penetrations in fire-resistance-rated walls.
   3. Penetrations in horizontal assemblies.
   4. Exposed penetration firestopping systems.

C. Related Requirements:
   1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.
   2. Section 079200 "Joint Sealants" for non-fire-resistance-rated joint sealants.
   3. Section 079219 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Unlisted Firestopping Systems: Obtain an Engineering Judgment (EJ) from firestopping manufacturer where no UL, FM Approvals, or other listed assembly is available for particular firestop configuration. Follow International Firestop Council (IFC) recommended guidelines for evaluating firestopping systems in EJs.

C. 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 developed in accordance with current

International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Installation Responsibility: Assign installation of penetration firestopping and fire-resistive joint systems to a single qualified firestop contractor.

C. Manufacturer Qualifications: Entity that has received UL's "Firestop Movement Certification," which demonstrates that manufacturer's firestopping products designated with M-Ratings are based on exposure to cyclic movement and UL 1479 fire test evaluation when tested in accordance with ASTM E3037.

D. Provide the following upon request:
   1. Qualification Data: For Installer.
   2. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping systems 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 system materials in accordance with manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be accessed and installed in accordance with 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 SOURCE LIMITATIONS

A. Obtain penetration firestopping systems for each type of opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. A qualified testing agency, acceptable to authorities having jurisdiction, will perform penetration firestopping system tests.
   2. Test in accordance with testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
      a. Penetration firestopping systems installed with products bearing the classification marking of a qualified testing agency.
         1) UL in its online directory "Product iQ."
         2) Intertek Group in its "Directory of Building Products."
         3) FM Approvals in its "Approval Guide."

B. Provide components for each penetration firestopping system that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water, or other forms of moisture characteristic during and after construction.

C. Provide components for each penetration firestopping system that do not contain ethylene glycol.

D. Provide components for each penetration firestopping system that are sufficiently flexible to accommodate movement, such as pipe vibration, water hammer, thermal expansion, and other normal building movement without damage.

E. Provide components for each penetration firestopping system that are appropriately tested for the thickness and type of insulation utilized.

2.3 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 must be compatible with one another, with the substrates forming openings, and with penetrating items if any.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. 3M Building and Construction.
      b. Hilti, Inc.
      c. Specified Technologies Inc.
      d. Tremco Incorporated.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
   1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
   2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
   1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
   2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:
      a. Those within the cavity of a wall.
      b. Floor, tub, or shower drains within a concealed space.
      c. 4-inch (200-mm) or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.

D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84 or UL 723.
   1. Sealant shall have a VOC content of 250 g/L or less.

2.4 ACCESSORIES

A. 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, including but not limited to:
   1. Permanent forming/damming/backing materials.
   2. Substrate primers.
   3. Collars.
   4. Steel sleeves.

2.5 FILL MATERIALS

A. Cast-in-Place Firestopping 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. Firestopping 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 strips for use around combustible penetrants.

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: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, and when required by a listed system, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed or dislodged.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

K. Thermal and Endothermic Wraps: Flexible, insulating, and fire-resistant protective wraps tested and listed for up to 2-hour fire ratings in accordance with ASTM E814 or UL 1479; for protecting membrane penetrations of utility boxes, critical electrical circuits, communications lines, and fuel lines, and for thermal barrier and circuit integrity protection in accordance with ASTM E1725 or UL 1724.

L. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls which accept standard accessories.

M. Fire-Rated Cable Pathways: Single or gangable device modules composed of a steel raceway with integral intumescent material and requiring no additional action in the form of plugs, twisting closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.
   1. Fire-rated cable pathway devices are the preferred product for data, video, and communications cable penetrations. Install these devices in locations where frequent cable moves, add-ons, and changes will occur. Such devices must be:
      a. Capable of retrofit around existing cables.
      b. Designed so that two or more devices can be ganged together.
      c. Maintenance-free so no action is required to activate the smoke- and fire-sealing mechanism.
   2. Where fire-rated cable pathway devices are not practical, openings within walls and floors designed to accommodate data, video, and communications cabling must be provided with re-enterable products specifically designed for retrofit, such as retrofit devices for cable bundles, firestopping putty, plugs, or pillows.

N. Retrofit Device for Cable Bundles: Factory-made, intumescent, collar-like device for firestopping existing over-filled cable sleeves and capable of being installed around projecting sleeves and cable bundles.

O. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.

P. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestopping gasket for use around rectangular steel HVAC ducts without fire dampers.

Q. Firestopping Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.

R. Fire-Rated Cable Grommet: Molded two-piece grommet made of plenum-grade polymer and foam inner core for sealing small cable penetrations in gypsum walls up to 1/2 inch (13 mm) in diameter.

S. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.

2.6 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 in accordance with manufacturer's written instructions and with the following requirements:
   1. Remove foreign materials from substrate surfaces 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 in accordance with penetration firestopping system manufacturer's written installation instructions, 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 in accordance 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 indicated.
   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 (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. (4.57 m) from end of wall and at intervals not exceeding 30 ft. (9.14 m).

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 (150 mm) 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 inspection agency to conduct and report on inspections in accordance with ASTM E2174.

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 - GENERAL

A. General: Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory: under product Category XHEZ.

B. Through-Penetration UL Classification System: Per the following Schedule.

3.8 SCHEDULES

A.

	Fire Stopping Systems	UL Classification System		
		Construction	Type Of	System
		Penetrated	Construction	Identification
1	No Penetrating Items:	F, W, C	A, B, J, K, L	0001-0999
2	Metallic Pipes, Conduit or Tubing:	F, W, C	A, B, J, K, L	1001-1999
3	Nonmetallic Pipe, Conduit or Tubing:	F, W, C	A, B, J, K, L	2001-2999
4	Electric Cables:	F, W, C	A, B, J, K, L	3001-3999
5	Cable, Trays with Electric Cables:	F, W, C	A, B, J, K, L	4001-4999
6	Insulated Pipes:	F, W, C	A, B, J, K, L	5001-5999
7	Electrical Bus Duct Penetrations:	F, W, C	A, B, J, K, L	6001-6999
8	Mechanical Ductwork Penetrations:	F, W, C	A, B, J, K, L	7001-7999
9	Multiple Penetrations Through Common Openings:	F, W, C	A, B, J, K, L	8000-8999
	Construction Penetration			
F -	Floor penetration			
W -	Wall penetration			
C -	Either floor or wall penetration			
	Type of Construction			
A -	Concrete floors equal to or less than 5-inches thick			
B -	Concrete floors greater than 5-inches thick			
J -	Concrete or masonry walls equal to or less than 8-inches thick			
K -	Concrete of masonry walls greater than 8-inches thick			
L -	Framed walls			

END OF SECTION

SECTION 078443

JOINT FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Application of Joint Firestopping.

B. Principal Products:
   1. Joints in or between fire-resistance-rated construction.
   2. Joints at exterior curtain-wall/floor intersections.

C. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

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

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an EJ or equivalent fire-resistance-rated assembly developed in accordance with current IFC guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written installation instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals in accordance with FM Approvals 4991 or been evaluated by UL and found to comply with UL's "UL Solutions Qualified Firestop Contractor Program."

B. Installer Qualifications: A firm experienced in installing joint firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Installation Responsibility: Assign installation of penetration firestopping and fire-resistive joint systems to a single qualified firestop contractor.

D. Provide the following upon request:
   1. Qualification Data: For Installer.
   2. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems in accordance with manufacturer's written installation instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed in accordance with specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. A qualified testing agency, acceptable to authorities having jurisdiction, will perform joint firestopping system tests.
   2. Test in accordance with testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
      a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.
         1) UL in its online directory "Product iQ."
         2) Intertek Group in its "Directory of Building Products."

B. Rain/Water Resistance: For perimeter fire-barrier system applications, where inclement weather or greater-than-transient water exposure is expected, use products that dry rapidly and cure in the presence of atmospheric moisture sufficient to pass ASTM D6904 early rain-resistance test (24-hour exposure).

2.3 JOINT FIRESTOPPING SYSTEM TYPES

A. General: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
   1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
   2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
   3. Provide firestop products that do not contain ethylene glycol.
   4. Provide additional component systems as may be required by manufacturers to satisfy compatibility requirement.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined in accordance with ASTM E1966 or UL 2079, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. 3M Building and Construction.
      b. Balco; a CSW Industrials Company.
      c. CEMCO; California Expanded Metal Products Co.
      d. ClarkDietrich.
      e. Everkem Diversified Products, Inc.
      f. Grabber Construction Products, Inc.
      g. Hilti, Inc.
      h. International Fireproof Technology Inc.
      i. Marino\\WARE.

j. Nelson; Emerson Electric Co., Automation Solutions.
k. NUCO Inc.
l. Owens Corning.
m. Passive Fire Protection Partners.
n. RectorSeal Firestop; a CSW Industrials Company.
o. ROCKWOOL.
p. Specified Technologies, Inc.
q. Tremco Incorporated.
r. Willseal LLC.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined in accordance with ASTM E2307.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. 3M Building and Construction.
b. Balco; a CSW Industrials Company.
c. Everkem Diversified Products, Inc.
d. Grabber Construction Products, Inc.
e. Hilti, Inc.
f. Johns Manville; a Berkshire Hathaway company.
g. Nelson; Emerson Electric Co., Automation Solutions.
h. NUCO Inc.
i. Owens Corning.
j. RectorSeal Firestop; a CSW Industrials Company.
k. ROCKWOOL.
l. Specified Technologies, Inc.
m. Tremco Incorporated.
2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined in accordance with ASTM E84.

2.4 ACCESSORIES

A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, 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 joint firestopping systems, clean joints in accordance with fire-resistive joint system manufacturer's written installation instructions and the following requirements:
   1. Remove foreign materials from substrate surfaces that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
   2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Prime substrates in accordance with joint firestopping system manufacturer's written installation instructions, using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Apply a suitable bond breaker to prevent three-sided adhesion in applications where condition occurs.

3.3 INSTALLATION

A. General: Install joint firestopping systems in accordance with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
   1. Apply elastomeric fill in voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
   2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
   3. For elastomeric 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 firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. (4.57 m) from end of wall and at intervals not exceeding 30 ft. (9.14 m).

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge, so labels are visible to anyone seeking to remove joint firestopping system. 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 - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing 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 in accordance with ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint 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 elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE - GENERAL

A. Where UL-classified systems are indicated, they refer to system numbers in UL's online directory "Product iQ" under product Category XHBN or Category XHDG.

3.8 SCHEDULE

A.

Fire Resistive Joint and Curtain Wall Firestop Systems - UL Classification System		
System Type:	Movement Capabilities	Joint Width
Floor to Floor: FF	S, D	0000 - 0999
Wall to Wall: WW	S, D	0000 - 0999
Floor to Wall: FW	S, D	0000 - 0999
Head of Wall: HW	S, D	0000 - 0999
Floor to Wall: FW	S, D	0000 - 0999
Curtain Wall: CW	S, D	0000 - 0999
Note: If Intertek Curtain Wall system is used, nomenclature will be CEJ or HI/BP		

Movement Capability	
S	Static
D	Dynamic

Joint Width	
0000 - 0999	Less than or equal to 2 inches.
1000 - 1999	Greater than 2 inches and less than or equal to 6 inches.
2000 - 2999	Greater than 6 inches and less than or equal to 12 inches.
3000 - 39999	Greater than 12 inches and less than or equal to 24 inches.
4000 - 4999	Greater than 24 inches.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Exterior and interior joint sealants and accessories.

B. Principal Products:
1. Exterior exposed nontraffic sealants.
2. Exterior pedestrian and garage traffic sealants.
3. Exterior concealed joints.
4. Exterior preformed joint seals.
5. Interior sealants and caulking.
6. Acoustic sealants.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting minimum one week before starting Work of this Section for exterior building sealants.
2. Additional Attendees:
a. Installers of exterior building sealants.
b. Glazing system installer.
c. Air barrier installer.
d. Roofing installer.

1.3 ACTION SUBMITTALS

A. Submittal Procedures:
1. Provide submittals for all sealants, exterior and interior, in a single group, regardless of how many subcontractors will install sealants. Multiple submittals for sealants are not acceptable.

B. Product Data:
1. Each sealant type.
2. Expanding tape seals.
3. Initial selection color charts and Samples.

C. Joint Sealant Schedule:
   1. Joint types.
   2. Joint locations.
   3. Sealant types and proprietary products.
   4. Joint sealant colors.

D. Samples:
   1. Cured sealant custom color ribbons; 12 inches minimum length.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Provide written verification and list of products for Work under subsequent work packages that the same proprietary sealants will be used that were used for previous work packages.

B. Test and Evaluation Reports: Manufacturer or Independent testing agency testing results.
   1. Compatibility and adhesion test reports.
   2. Staining potential test reports.

C. Field Quality Control Submittals: Field test and inspection reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data.

B. Warranty Documentation: Sealants.

1.6 QUALITY ASSURANCE

A. Preconstruction Testing: Complete testing 30 days minimum before scheduled field installation or as recommended by manufacturer.
   1. Adhesion: Field Test exterior wall sealants for adhesion to metal, stone, masonry, and concrete per ASTM C794 and manufacturer published requirements to determine need for primer and substrate preparation.
   2. Staining: Laboratory Test exterior wall and interior tile sealants for staining of metal, stone, masonry, concrete, and substrates per ASTM C1248.

B. Mockups: Install sealants in exterior wall mockups. Demonstrate product interfaces, intersections, and terminations.
   1. Adhesion: Test sealant joints in mockup per ASTM C1193, Method A in Appendix X1.1 or ASTM C1521, Method A. At joints between different materials, test each joint surface separately.
   2. Approved mockups establish work results standard.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Temperature: Perform work within sealant manufacturer published temperature limits.
   2. Precipitation: None occurring and none predicted during installation.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Exterior Sealants: Warrant joint sealants will provide a watertight weather seal for the Warranty duration.
      a. Failure includes loss of elastomeric properties and required performance attributes.
      b. For porous substrates, failure also includes discoloration of substrates.
      c. Warranty Period, Urethanes: Five years.
      d. Warranty Period, Silicones: 20 years.

PART 2 PRODUCTS

2.1 SEALANTS - GENERAL

A. Source Control: Provide one proprietary product for each type of sealant required, regardless of what Subcontractor installs the sealant.
   1. Installers of joint sealants under subsequent work packages must use the same proprietary sealants used in the first work package that includes joint sealants.

B. Select proprietary sealants for compatibility with other construction products that the sealants will contact.

C. Multiple colors may be required for exposed sealants to coordinate with substrate colors.

2.2 EXTERIOR EXPOSED NONTRAFFIC SEALANTS

A. Class 50 Silicone Nonstaining Sealant: Single component, nonsag, neutral curing; ASTM C920, Type S, Grade NS, Class 50, Use NT; classed as nonstaining when tested per ASTM C1248.
   1. Manufacturers and Products:
      a. Dow DOWSIL 756 SMS.
      b. GE Construction Sealants SCS9000 SilPruf NB.
      c. Pecora Corporation 864NST.
      d. Tremco Spectrem 3.
   2. Colors: Architect selected.
   3. Applications:
      a. Joints between brick and metal.
      b. Control joints in brick.
      c. Joints between brick and stone.

d. Joints between concrete and metal.
e. Other exposed exterior sealant joints shown on Drawings.

2.3 EXTERIOR PEDESTRIAN [AND GARAGE] TRAFFIC SEALANTS

A. Pourable Silicone Sealant: ASTM C920, Type S, Grade P, Class 100/50, Uses T, M, A, O.
   1. Manufacturers and Products:
      a. Dow DOWSIL 890 SL.
      b. Pecora Corporation 300SL.
      c. Tremco Spectrem 900SL.
   2. Color: Architect selected.
   3. Applications: Exterior joints in horizontal traffic surfaces.

2.4 EXTERIOR CONCEALED SEALANTS

A. Butyl Sealant: ASTM C1311.
   1. Manufacturers and Products:
      a. Pecora Corporation BC-158.
      b. Tremco Butyl Sealant.
      c. C.R. Laurence 888.
   2. Applications.
      a. Below thresholds.
      b. Sheet metal laps.

B. Silicone Air Barrier Sealant: Single component, nonsag, neutral curing; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Manufacturers and Products:
      a. Dow DOWSIL 758 Silicone Weather Barrier Sealant.
      b. Pecora Corporation AVB Silicone Sealant.
   2. Applications:
      a. Primary weatherproofing exterior joints between air and water resistive membranes and fenestration, doors, and louvers.

2.5 EXTERIOR PREFORMED JOINT SEALS

A. Silicone Extrusion Seals: Cured low-modulus silicone extrusion transition membrane and liquid-applied sealant for exterior wall openings.
   1. Manufacturers and Products:
      a. Dow DOWSIL Silicone Transition System with DOWSIL 758 silicone adhesive.
      b. Pecora Corporation Sil-Span with 864NST silicone adhesive.
      c. Sika Silbridge-300 with Sikasil WS-295.
      d. Tremco Spectrem Simple Seal with Spectrem 1 Silicone Sealant.
   2. Joint Widths: See Drawings.
   3. Applications:
      a. Transitions between air and water resistive membrane and fenestration, doors, and louvers.

b. Coping and parapet joints.

2.6 INTERIOR SEALANTS AND CAULKING

A. Interior Color Sealant: Silane-modified polymer sealant or urethane; ASTM C920, Type S, Grade NS, Class 50, Uses T and NT.
   1. Manufacturers and Products:
      a. Pecora Corporation DynaTrol DynaTrol I XL FTH.
      b. Sika Sikaflex HY 150.
   2. Colors: Architect selected.
   3. Applications:
      a. Interior joints noted as sealant on Drawings.
      b. Control and expansion joints in tile, except where sanitary sealant is shown.
      c. Terminations of wall coverings at tile and other materials.
      d. Sealant joints in ornamental metals.

B. Sanitary Sealant: Mildew-resistant silicone; ASTM C920, Type S, Grade NS, Class 25 or greater, Use NT.
   1. Manufacturers and Products:
      a. Dow DOWSIL 786 SILICONE SEALANT.
      b. Pecora Corporation; 898 NST.
      c. Tremco Incorporated Tremsil 200 Sanitary.
   2. Colors: Architect selected.
   3. Applications:
      a. Joints around plumbing fixtures and fittings.
      b. Joints between showers and tile.
      c. Perimeters of lavatory counters.

C. Paintable Caulking: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
   1. Manufacturers and Products:
      a. Pecora Corporation AC20.
      b. Sika MasterSeal NP 520.
      c. Tremco Tremflex 834.
   2. Applications:
      a. Interior joints noted as caulking.
      b. Joints, crevices, and irregularities wider than hairline joints in or between dissimilar materials and painted surfaces.
      c. Perimeters of door frames, frames and trim for glazing, and frames or trim for other wall and ceiling openings at painted surfaces.

2.7 ACOUSTIC SEALANTS

A. Manufacturer’s gun-grade, non-sag, permanently elastomeric complying with ASTM C919.

B. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per

ASTM E90.

C. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E90.

D. 40 pcf minimum density and maximum hardness of 50 durometer (shore A).

E. Non-hardening and non-shrinking.

F. Manufacturers and products:
1. Specified Technologies SpecSeal SIL Elastomeric Firestop Sealant.
2. Tremco TREMstop Fyre-Sil Firestop Silicone Sealant.
3. Nuco Inc Self-Seal GG-200 Non-Sag Silicone Firestop.
4. HoldRite HydroFlame 300CG Caulk Grade Silicone Firestop Sealant.
5. 3M 2000+ Fire Barrier Silicone Sealant.
6. Tremco Acoustical Sealant by Tremco, concealed locations only.
7. US Gypsum “Sheetrock Acoustical Sealant” .
8. Pecora Corp. “AC-20 FTR Acoustical and Insulation Sealant” .
9. Hilti CP-572 Smoke and Acoustic Spray.

2.8 SHEET CAULKING (ELECTRICAL OUTLET BOX PADS)

A. For sealing the backs and sides of standard electrical back boxes. Available in sheets or pads of standard sizes.

B. Polybutene-butyl or equal fire-resistant pads with inert fillers, 1/4” x 4” x 8” or 1/8” x 6” x 8” in size.

C. Manufacturers and Products:
1. Outlet Box Pads by Harry A. Lowry & Associates.
2. Isobacker by Kinetics Noise Control.
3. SpecSeal Firestop Putty Pads (fire-rated) by Specified Technologies, Inc.

2.9 INSTALLATION ACCESSORIES

A. Primer: As required by sealant manufacturer.

B. Backer Rod: ASTM C1330, Type C, closed-cell or Type O, open-cell, manufacturer recommended types.

C. Bond Breaker Tape: Self-adhesive plastic tape to prevent sealant from adhering to back of joint.

D. Cleaners: Manufacturer recommended types.

E. Masking: Non-staining, self-adhesive.

2.10 MIXES

A. Multicomponent Sealants: Mix components immediately before use.

B. Field-Tinted Products: Mix colorant with base to uniform consistency and custom color.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean joint surfaces for optimum adhesion. Remove dirt, moisture, and incompatible substances.

B. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.

C. Remove laitance and form release agents from concrete.

D. Prime joint surfaces where recommended by sealant manufacturer. Protect adjacent surfaces from misapplication or spillage of primer.

E. Mask surfaces adjacent to joints to receive elastomeric sealants. Remove masking after tooling.

3.2 INSTALLATION, GENERAL

A. Installation Reference Standard: Follow ASTM C1193.

B. General Installation Requirements:
   1. Exterior Joint Sealants: Provide continuous, weatherproof seals to prevent infiltration of air and water through the joints.
   2. Interior Joint Sealants: Provide continuous seals to prevent air infiltration through the joints in which they are installed. Install sanitary sealant to prevent water infiltration.
   3. Appearance: Apply sealants with smooth surfaces free of gaps, voids, bubbles, lumps, crevices, runs, drips, striations, and other irregularities.

C. Set joint filler units at uniform depths in joints to support sealants and maintain proper sealant cross section shape and depth recommended by manufacturer for each application.

D. Set joint filler for sealant neck dimension 1/3 of joint width, maximum, or as recommended by manufacturer for application.

E. Install joint fillers under compression and friction fit. Do not install filler units that have absorbed water.
   1. Do not leave voids or gaps between ends of joint filler units.
   2. Do not stretch, twist, puncture, or tear joint fillers.
   3. Remove joint fillers that have absorbed moisture or which have ruptured gas cells and

install suitable new fillers before sealant application.

F. Install bond breaker tape where shown on Drawings or where joint filler is not used to prevent adhesion to back of joint.

G. Deposit sealants in uniform, continuous ribbons without gaps or air pockets.

H. Tool sealants to ensure full adhesion. Form smooth, slightly concave surface.

I. Cure joint sealants.

3.3 ACOUSTICAL SEALANTS

A. Apply acoustical sealant to assemblies indicated in contract documents and to:
   1. Door frames – both sides, entire perimeter.
   2. Window frames – both sides, entire perimeter.
   3. Penetrations by piping, HVAC ducts, conduits, cables and cable trays.
   4. Head, sill and perimeter of partitions.
   5. Perimeter of all sound isolating ceilings.
   6. Penetrations of Resilient Flooring as required.
   7. Joints between layers of gypsum board partition and ceiling constructions.

B. Use continuous beads of acoustical sealant to seal assemblies.

C. Comply with recommendations of ASTM C919.

3.4 SHEET CAULKING

A. Cover the back and sides of all electrical, telephone, and communication boxes in full height, sound rated, and sound sensitive walls with acoustical pad as specified.

B. Examine that all unused knockouts are plugged before installing the pads.

C. Mold pads tightly to the boxes and to the adjacent surfaces.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not use materials that fail tests and inspections.

B. Adhesion Testing: ASTM C1521, Method A.
   1. Perform three tests.
   2. Report Content:
      a. Presence of voids and discontinuities.

b. Sealant dimensions and seal shape.
c. Failures in adhesion and cohesion.

C. Non Conforming Work: Remove sealants that do not pass tests, reapply sealant, and retest.

3.6 CLEANING

A. Clean spills, misapplications, and material migrations immediately as they occur.

B. Clean marred surfaces by whatever means are necessary to eliminate evidence of spillage.

END OF SECTION

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior and interior hollow metal doors and frames.

B. Principal Products:
   1. Extra heavy duty, non-rated exterior hollow metal doors and frames.
   2. Heavy duty, non-rated and rated interior hollow metal doors and frames.
   3. Heavy duty, non-rated interior hollow metal frames for wood doors.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work of this Section with masonry partitions, gypsum board partitions, glass and glazing, acoustic sealant, finish painting, and electrical power and control wiring.

B. Preinstallation Meetings:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Attendees: Wiring and security system installers.
   3. Agenda Items: Fire rating, acoustic rating, and electrified hardware wiring requirements.

1.3 ACTION SUBMITTALS

A. Product Data.
   1. Hollow metal doors and frames.

B. Shop Drawings: Show construction, sizes, configurations, reinforcements, anchorages, installation details.
   1. Door elevations showing cutouts.
   2. Door frame elevations.
   3. Hardware mounting locations.

C. Door Schedule: Use same designations as Drawings.
   1. Show door and frame types, sizes, ratings, glazing, and hardware sets.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers: SDI Certified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store and handle door frames maintaining spreader bars in place until installation.

1.6 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Ceco Door.
   2. Imperial USA.
   3. Or approved equal.

2.2 EXTERIOR DOORS AND FRAMES - EXTRA HEAVY DUTY

A. Doors: ANSI/SDI A250.8; 1-3/4 inch thick.
   1. Classification: Level 3, Physical Performance Level A.
   2. Model: 2, Seamless.
   3. Faces: Steel sheet, 0.053 inch thick, G90 coating.
   4. Core: Insulated.
   5. Top and Bottom Edges: Closure channel, top edge sealed watertight.

B. Frames: ANSI/SDI A250.8.
   1. Material: Steel sheet, 0.053 inch thick, coating matching door face.
   2. Construction: Full profile welded, mitered corners.
   3. Thermal Break: Manufacturer standard.

2.3 INTERIOR DOORS AND FRAMES - HEAVY DUTY

A. Doors: ANSI/SDI A250.8; 1-3/4 inch thick.
   1. Classification: Level 2, Physical Performance Level B.
   2. Model: 2, Seamless.

3. Faces: Steel sheet, 0.042 inch thick, A40 coating.
4. Fire Rated Door Core: Manufacturer standard.
5. Non-Fire Rated Door Core: Kraft paper honeycomb.

B. Frames: ANSI/SDI A250.8.
1. Material: Steel sheet, 0.053 inch thick, coating matching door face.
2. Construction: Full profile welded, mitered corners.

2.4 OTHER FRAMES

A. Frames: ANSI/SDI A250.8; heavy duty.
1. Application: Frames for wood doors and borrowed lights.
2. Material: Steel sheet, 0.053 inch thick, A40 coating.
3. Construction: Full profile welded, mitered corners.

2.5 PERFORMANCE

A. Fire Resistance:
1. Test: NFPA 252 or UL 10C.
2. Labeling: NFPA 80.
3. Glazing Size Limits: NFPA 80.

B. Environmental Performance: Exterior doors.
1. Air Infiltration: AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400; 0.20 cfm/sf, maximum at 1.57 psf pressure differential.
2. Water Penetration: AAMA/WDMA/CSA 101/I.S.2/A440; no leakage at 2.92 psf pressure differential.
3. Thermal Transmission: U-0.37, maximum.
4. Expansion and Contraction: Withstand 120 degree F ambient and 180 degree F surface thermal cycling without failure.

C. Acoustic Performance:
1. STC: ASTM E90; 35, minimum.

2.6 MATERIALS

A. Steel Sheet: ASTM A653/A653M; hot-dip galvanized coating.

B. Insulation:
1. Door Core: Polyurethane or Polystyrene.
2. Door Frame: ASTM C665, Type 1, unfaced mineral fiber.

C. Glass and Glazing: See Section 088000.

D. Fasteners: Manufacturer standard.
1. Steel Coating: ASTM A153/A153M hot-dip galvanized.

2.7 FABRICATION

A. Fabricate doors and frames with hardware reinforcement welded in place.
   1. Reinforce doors and frames for surface applied hardware without through bolting.
   2. Hardware Locations: ANSI A250.8.

B. Door Edges: Beveled.

C. Frames within Masonry Openings:
   1. Protect frame hardware preparations with mortar guard boxes.
   2. Head: 4 or 2 inches aligning with coursing.

D. Reinforce frames wider than 48 inches with flush roll formed steel channels fitted tightly into frame head.

E. Prepare interior frames for silencers, except where sound seals and smoke seals are specified.
   1. Single Door Strike Jambs: 3 silencers.
   2. Paired Door Heads: 2 silencers.

F. Attach fire rating label to each rated door and frame.
   1. Fire Rated Doors: Fire rating label.

G. Fabrication Tolerances: SDI-117.

2.8 FINISHES

A. Primer Materials: See Section 099000.

2.9 ACCESSORIES

A. Removable Stops: Steel sheet, rolled channel shape, mitered corners.

B. Paired Door Astragals: Steel, T-shaped.

C. Galvanizing Repair Materials: ASTM A780/A780M.

D. Weatherstripping: See Section 087100.

E. Silencers: See Section 087100.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Verify opening sizes are within tolerance limits.

3.2 INSTALLATION

A. Install doors and frames. Follow ANSI/SDI A250.8.
   1. Fire Rated Doors: NFPA 80.

B. Interface with Other Work:
   1. Coordinate door frame and anchor installation with masonry, gypsum board, and concrete jamb construction.
   2. Coordinate door and frame installation with door hardware installation. See Section 087100. Install silencers before installing frame.
   3. Coordinate removable stop installation with glass installation. See Section 088000.

C. Install steel reinforcement channels between two abutting frames. Anchor channels to overhead structure and floor.

D. Install door louvers plumb and level.

E. Installation Tolerances: SDI-117.

F. Repair damaged zinc coatings. Follow ASTM A780/A780M.

G. Seal door frames to adjacent wall or partition construction. See Section 079200.

H. Field paint doors and frames. See Section 099000.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Inspections:
   1. Fire Rated Doors: Inspect per NFPA 80.
   2. Egress Doors: Inspect per NFPA 101.

C. Reporting: Prepare code-required reports and submit to Owner.

D. Non-Conforming Work: Make corrections or replace, and retest.

3.4 ADJUSTING

A. Adjust door for smooth and balanced door movement.

B. Ensure fire rated doors self close and latch.

END OF SECTION

SECTION 081416

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Wood doors in hollow metal frames in ADMIN Buildng.

B. Principal Products:
   1. Flush wood doors, prefinished.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Each type of wood door; describe face, core material, and finish.
   2. Door louvers.
   3. Initial color charts or Samples.

B. Shop Drawings.
   1. Each wood door type. Include veneer leaf layout and finish.

C. Schedules: Use same designations as Drawings.

D. Samples:
   1. Face Material and Finish: Manufacturer standard size.
   2. Transparent Finish Range Samples: Submit three each of light, medium and dark stain samples for selection.
   3. Flush Doors: Corner construction with finished faces and edges; 12 by 12 inches.

1.3 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer test results showing:
   1. Fire ratings.
   2. STC ratings.

1.4 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For flush wood doors.

1.5 QUALITY ASSURANCE

A. Mockups: Install flush wood doors in Architect selected mockup specified in Section 014341.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: ANSI/WDMA-I.S 1A.
   1. Identify doors on bottom edge and packaging with numbering system used on Drawings.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Building enclosed, wet work complete, and environmental systems maintaining design conditions for Owner occupancy.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Flush Wood Doors: Warrant against product failure.
      a. Failure includes delamination, warping more than 1/4 inch, screw withdrawal, or telegraphing of core through veneer.
      b. Warranty Period:
         1) Interior Doors: Lifetime.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Masonite Architectural.
   2. Oshkosh Door Company.
   3. TruStile.
   4. VT Industries.

2.2 FLUSH WOOD DOORS - GENERAL

A. Door Standards: ANSI/WDMA I.S. 1A.
   1. Quality Standard: Heavy Duty.
   2. Aesthetic Grade: Premium.

B. Fire Rated Wood Doors: NFPA 80; listed and labeled for required ratings based on testing at positive pressure per NFPA 252 and UL 10C.
   1. Temperature Rise Limit Doors: 250 deg F above ambient, maximum transmitted

temperature on faces not directly exposed to flame after 30 minutes of exposure.
2. Blocking: Composite blocking maintaining WDMA performance level and eliminating hardware through-bolting.
3. Vertical Edge Construction:
   a. Category A Positive Pressure: Integral intumescent seals concealed by outer stile.
4. Pairs:
   a. Fire-retardant stiles with concealed intumescent seals listed and labeled without formed steel edges and astragals.

C. Smoke and Draft Control Doors: Listed and labeled per UL 1784.

D. Acoustic Rated Wood Doors: Tested per ASTM E90 and ASTM E413.
1. STC Ratings: 32, minimum.
2. Gasketing and Door Shoes: See Section 087100; as required to meet tested acoustic rating.

E. Core Materials, Solid Core, Non-Fire-Rated Doors:
1. Structural Composite Lumber: WDMA T.M.10.

2.3 FLUSH WOOD DOORS FOR TRANSPARENT FINISH

A. Transparent Finish Flush Wood Doors: ANSI/WDMA I.S. 1A.
1. Faces: Veneer Grade AA.
   a. Veneer Species: Architect selected.
   b. Veneer Cut: See Drawings.
   c. Veneer Leaf Match: See Drawings.
   d. Veneer Face Match/Assembly: See Drawings.
2. Thickness: 1-3/4 inches.

2.4 DOOR LOUVERS

A. Wood Louvers:
1. Design: Slat.
2. Transparent Finish: Match wood species, cut, and finish of door faces.
3. Opaque Finish: Paint grade wood with factory-applied primer.
   a. Color: Match door.

2.5 PERFORMANCE

A. Fire Resistance:
1. Test: NFPA 252 or UL 10C.
2. Labeling: NFPA 80.

B. Acoustic Performance:
1. STC: ASTM E90 and ASTM E13.

2.6 FABRICATION

A. Factory Fitting: Fit to frame openings with clearances specified in ANSI/WDMA I.S. 1A.
   1. Fire Rated Doors: Comply with NFPA 80.

B. Prehung Doors: Factory hang doors in frames. Brace frames for shipment and installation to prevent racking.

C. Factory Machining: Machine doors for hardware that is not surface applied.
   1. Verify dimensions for hardware mortises in metal frames before machining.

D. Openings:
   1. Cut openings and install louvers at factory.

2.7 FINISHES

A. Finish Grade: Match grade of door.

B. Transparent Finish System: WDMA TR-6 catalyzed Polyurethane.
   1. Staining: Architect selected.
   2. Sheen: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that door frames provided under other Specification sections are plumb, square, and accurate size.

B. Inspect each door before installation for damage and defects per ANSI/WDMA I.S. 1A Section F-6.

3.2 INSTALLATION

A. Installation Reference Standards:
   1. Wood Doors: ANSI/WDMA I.S. 1A.
   2. Fire Rated Doors: NFPA 80.
   3. Smoke and Draft Control Doors: NFPA 105.
   4. Wood Frames and Casing Trim: ANSI/AWI 0620, Custom grade.

B. Hardware Installation: Section 081700.

C. Install casing trim with mitered joints.

D. Align doors with uniform vertical and top edge clearance.

E. Verify that each door operates smoothly, does not bind in frame, and latches securely.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Inspections:
   1. Fire Rated Doors: Inspect per NFPA 80.
   2. Egress Doors: Inspect per NFPA 101.

C. Reporting: Prepare code required reports and submit to Owner.

D. Non-Conforming Work: Make corrections or replace, and retest.

3.4 REPAIR

A. Repair of damage or defects is subject to Architect acceptance, including removal of soiling. Replace doors that cannot be satisfactorily repaired.

3.5 CLEANING

A. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

SECTION 083100

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Wall and ceiling access doors and frames.

B. Principal Products:
   1. Glass fiber reinforced gypsum access doors.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate sizes and locations with controls, valves, traps, dampers, cleanouts, and similar items requiring operation that are located behind finished surfaces.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: Sizes, finishes, hardware, scheduled locations, and details of adjoining Work.

B. Shop Drawings:
   1. Locations and sizes of wall and ceiling access doors.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and sizes of access doors and panels.

B. Maintenance data.

1.5 QUALITY ASSURANCE

A. Mockups: Provide access doors in guest room mockup specified in Section 014341.
   1. Approved mockups establish Work results standard.

PART 2 PRODUCTS

2.1 WALL AND CEILING ACCESS DOORS AND PANELS

A. Glass Fiber Reinforced Gypsum Access Doors: Flush door and frame.
   1. Manufacturers and Products:
      a. Babcock Davis BGFR.
      b. Karp Associates GRGH.
      c. Nystrom GFR.
      d. Wind-Lock Stealth.
   2. Material: Glass fiber reinforced gypsum plaster.
      a. Finish: Natural white, uncoated.
   3. Door Type: Drop in.
   4. Hinges: Concealed.
   5. Latches: Keyed cam lock operation.
   6. Accessories:
      a. Gasketing.

2.2 MATERIALS

2.3 FABRICATION

A. Size Variations: Obtain acceptance of manufacturers standard size units which vary slightly from sizes shown or scheduled.

B. Provide manufacturers recommended anchorage fasteners for Project applications.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face parallel to adjacent finished surface.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position units to provide convenient access to concealed Work requiring access.

C. GFRG Doors: Screw attach units to framing without cracking. Drive heads slightly below surface.

END OF SECTION

SECTION 083323

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Insulated service doors; electrically-operated at Maintenance and Wash Station.
2. Uninsulated service doors; manually-operated.

B. Related Requirements:

1.2 PERFORMANCE REQUIREMENTS

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

B. System and Components shall be designed to withstand the greater of the following minimum loads, or combinations thereof. Load combinations shall be as per the requirements of the 2018 International Building Code and ASCE 7.
1. Wind load design pressures and / or suctions including interior pressure coefficients have been interpolated from the results of the RWDI Wind Tunnel Test Report dated February 8, 2022, provided as Appendix E.
2. Submit wind uplift calculations validating systems and components in accordance with wind load design pressures, corner zones, and edge zones as indicated.
3. All other design loads shall be calculated in accordance with ASCE 7 using parameters as indicated and as shown on the Structural Drawings.

C. Fire-Rated Door Assemblies: Complying with NFPA 80; listed and labeled by qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

D. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

E. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
1. Wind Loads: As calculated in accordance with applicable code and ASCE 7 using wind load parameters shown on the Drawings.
2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.
   1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
   3. Include description of automatic-closing device and testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
   5. Show locations of controls, detectors or replaceable fusible links, and other accessories.
   6. Include diagrams for power, signal, and control wiring.

C. Delegated-Design Submittal: For overhead coiling doors.
   1. Include shop drawings and calculations with each sheet signed and sealed by professional engineer responsible for the submittal.
   2. Indicate design input for calculations taken from Structural Drawings and derived from applicable codes and specified reference standards.
   3. Indicate location and magnitude of loads applied to building structure.
   4. Indicate designed performance that meets or exceeds the specified performance.
   5. Indicate limiting conditions controlling the resulting design.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
   1. Curtain slats.
   2. Bottom bar with sensor edge.
   3. Guides.
   4. Brackets.
   5. Hood.
   6. Include similar Samples of accessories involving color selection.

E. Qualification Data: For Installer.

F. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Special warranty.

B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
   1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
   1. Obtain operators and controls from overhead coiling-door manufacturer.

2.2 INSULATED COILING DOORS - MAINTENACE AND WASH BUILDINGS

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
   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 Wayne Dalton Corp. Thermotite 800C or comparable product by one of the following:
      a. Cookson Company.
      b. Cornell Iron Works, Inc.
      c. McKeon Rolling Steel Door Company, Inc.
      d. Overhead Door Corporation.
      e. Raynor.
      f. Wayne-Dalton Corp.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
   1. Include tamperproof cycle counter.

C. Curtain R-Value: 6.0 deg F x h x sq. ft./Btu.

D. Door Curtain Material: Galvanized steel.

E. Door Curtain Slats: Flat profile slats of manufacturer's standard height.
   1. Insulated-Slat Interior Facing: Metal.

F. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.

G. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

H. Hood: Match curtain material and finish.
   1. Shape: Round.
   2. Mounting: As indicated on Drawings.

I. Electric Door Operator:
   1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
   2. Operator Location: As indicated on Drawings.
   3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
   4. Motor Exposure: Exterior, wet, and humid.
   5. Emergency Manual Operation: Chain type.
   6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar; self-monitoring type.
      a. Sensor Edge Bulb Color: Black.
   7. Control Station(s): Where indicated on Drawings.

J. Curtain Accessories: Equip door with weatherseals.

K. Door Finish:
   1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
   2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 UNINSULATED COILING DOORS - TRANSFER CENTER

A. Unnsulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
   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 Wayne Dalton Corp. Thermotite 800C or comparable product by one of the following:
      a. Cookson Company.
      b. Cornell Iron Works, Inc.
      c. McKeon Rolling Steel Door Company, Inc.
      d. Overhead Door Corporation.
      e. Raynor.
      f. Wayne-Dalton Corp.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
   1. Include tamperproof cycle counter.

C. Curtain: Interlocking, roll-formed metal slats with endlocks attached to each end of alternating slats to prevent lateral movement.
   1. Slat Profile: No. 14, 3-inch flat slat.
   2. Material and Gauge: Galvanized Steel, 18-gauge.
   3. Finish: Match Curtain slats at insulated doors used at adjacent buildings.

D. Curtain R-Value: N/A.

E. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.

F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

G. Counterbalance Assembly: Spring barrel assembly serving as a load-carrying beam. Encases a helical torsion counterbalance spring system engineered for a design life cycle of 50,000 cycles.

H. Hood:
   1. 24-gauge galvanized steel hood complete with interior vinyl weather baffle.
   2. Mounting: As indicated on Drawings.

I. Operation: Chain hoist OR Crank.

2.4 MATERIALS, GENERAL

A. 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.

2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
   1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural-steel sheet; complying with ASTM A653/A653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch; and as required.
   2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.6 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
   1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized-steel sheet with G90 zinc coating, complying with ASTM A653.
   2. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
   3. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.7 CURTAIN ACCESSORIES

A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
   1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
   2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene nylon brushes Insert material.

B. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and reset release mechanism. Release mechanism for motor-operated doors shall allow testing without mechanical release of the door. Automatic-closing device shall be designed for activation by the following:
   1. Building fire-detection, smoke-detection, and -alarm systems.

2.8 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
   1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic-closing device operates.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.9 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Comply with NFPA 70.
   2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
   1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
   2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
   3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For fire-rated doors, activation delays closing.
   1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close".
   1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.10 CONTROLS AND SAFETIES

A. Electrical Connection: Accommodate 120 (plus or minus 10%) volt or 208 (plus or minus 10%) volt, single phase, 60 Hz. (plus or minus 1%) electrical service as indicated on Drawings.

B. For all hardwired equipment, provide UL listed control panels(s) containing all motor controllers, sequencing equipment, and other electrical components, which shall be rated to withstand branch circuit available fault current of 10,000 amperes, unless otherwise indicated on electrical single line diagrams or panelboard schedules for the distribution equipment that is the source for the feeder to the equipment, unless or as specifically permitted otherwise by the Engineer.

2.11 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written

instructions and as specified.

B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.

D. Fire-Rated Doors: Install according to NFPA 80.

E. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
   3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
   1. Adjust exterior doors and components to be weather resistant.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

3.5 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door 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. Perform maintenance, including emergency callback service, during normal working hours.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior and interior aluminum-framed entrances and storefronts.

B. Principal Products:
   1. Exterior, thermally broken, aluminum-framed entrances and storefronts.
   2. Interior aluminum-framed entrances and storefronts.

C. Related Requirements.
   1. Section 084413 "Glazed Aluminum Curtain Walls".
   2. Section 088000 “Glazing".

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Agenda Items:
      a. Coordination with air barrier installation.
      b. Hardware not supplied under this Section.

1.3 ACTION SUBMITTALS

A. Special Requirements: Transmit required submittals concurrently with submittals for the curtain wall system.

B. Product Data:
   1. Storefront framing, included tested performances.
   2. Glazed aluminum entrance doors.
   3. Entrance door hardware specified in this Section, on the drawings, and interior specifications.

C. Shop Drawings:
   1. Plans and elevations for each installation.
   2. Anchorage and support details.
   3. Details for continuity of air and water barrier with adjacent construction.
   4. Flashing and internal drainage details.

5. Thermal expansion and deflection provision details.
6. Trim details.
7. Sizes and locations of loads transmitted to building structural supports.

D. Schedules: Door hardware coordinated with hardware specified in Section 087100.

E. Samples:
1. Typical Framing Member: 12 inches long in required finish.
2. Door: 12 by 12 inch bottom door corner showing construction, reinforcement, glazing, and weatherstripping.

1.4 INFORMATIONAL SUBMITTALS

A. Delegated Design Submittals: Design calculations.
1. Aluminum-framed storefronts.

B. Qualification Statements: Installer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For framing system, doors, hardware, and finishes.

B. Warranty Documentation: For framing system, doors, hardware, and finishes.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer: Manufacturer trained or approved.
2. Licensed Professionals: Registered in state in which Project is located.

B. Mockups: Demonstrate product assembly, intersections, and terminations.
1. Build mockup of typical wall area as shown on Drawings.
2. Mockup Location: Field.
3. Mockups are subject to Field Quality Control testing to verify performance.
4. Photograph installation of sill flashing with end dams and other concealed components. Provide access to record photographs when requested by Architect.
5. Approved mockups establish work results standard.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: Follow AAMA CW-10.
1. Protect aluminum components from bending and from impact, abrasion, and other harmful contacts.
2. Maintain factory applied finish protections intact until removal is recommended by manufacturer.

1.8 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer Warranty: Repair or replace components that do not follow requirements or that fail in materials or workmanship.
   1. Failures under design conditions specified in performance requirements.
      a. Breakage or loss of glass.
      b. Permanent deformation of components or assemblies.
      c. Water penetration through fixed glazing.
      d. Failure of hardware specified in this Section.
   2. Warranty Period: Five years.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: 20 years.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Exterior Storefront Entrances: Thermally broken extruded aluminum framing system, reinforced to support loads.
   1. Manufacturers and Products:
      a. Kawneer IR 501T.
      b. Oldcastle BuildingEnvelope StormMax FG-5100T or StormMax FG-5750T.
      c. U.S. Aluminum Storm Front Series IT600.
      d. YKK AP Protek YHS 50 TU.
   2. Construction: Thermally broken.
   3. Wind Borne Debris: Impact Resistant.
   4. Glass Installation: 4-side captured, installed from exterior.
   5. Glazing Plane: Center.
   6. Profile Dimensions: See Drawings.
   7. Finish: Clear anodized.

B. Exterior Storefront Windows: Thermally broken extruded aluminum framing system, reinforced to support loads.
   1. Manufacturers and Products:
      a. Kawneer Impact Resistant Trifab 451T, Center Set, as Basis-of-Design.
      b. Oldcastle BuildingEnvelope Series 3000 Thermal MultiPlane.

c. U.S. Aluminum IT451T.
d. YKK AP YES 45 TU.

2. Construction: Thermally broken.
3. Wind Borne Debris: Impact Resistant.
4. Glass Installation: 4-side captured, installed from exterior.
5. Glazing Plane: Center.
6. Profile Dimensions: See Drawings.
7. Finish: Clear anodized.

C. Interior Storefront: Nonthermal extruded aluminum framing system, reinforced to support loads.
1. Manufacturers and Products:
a. Kawneer Trifab VersaGlaze 450, as Basis-of-Design.
b. Oldcastle BuildingEnvelope Series 14000 Non-Thermal or Series-3000 Multiplane.
c. U.S. Aluminum Series FF 450.
d. YKK AP YES 45 FS.
2. Glazing Plane: Center.
3. Profile Dimensions: See Drawings.
4. Finish: Clear anodized.

D. Formed Trim: Aluminum sheet, 0.060 inch minimum thickness, finished same as framing.

E. Exposed Flashing: Aluminum sheet, 0.060 inch minimum thickness, finished same as framing.

2.2 GLAZING

A. Glass: Section 088000.

B. Glazing Gaskets:
1. Material: Silicone and EPDM or other synthetic rubber; PVC not permitted.
2. Color: Black.

2.3 GLAZED ALUMINUM DOORS

A. Doors: Manufactured by storefront manufacturer, sized to coordinate with storefront framing. Provide internal reinforcement needed for hardware.
1. Thickness: 2-1/4 inches.
2. Stiles: Medium.
3. Bottom Rail: ADA-compliant.
4. Exterior Doors: Thermally broken, prepared for 1-inch insulating glass.
5. Interior Doors: Prepared for 1/4 inch glass.
6. Glazing Beads: Rectangular profile.
7. Manufacturer Name Plates: Acceptable on door edges only.
8. Finish: Match framing and Clear anodized.

2.4 HARDWARE

A. Hardware: See Section 087100 for items not specified in this Section.

B. Thresholds: Extruded aluminum, ADA-compliant profile; BHMA A156.21.
   1. Configuration:
      a. Width: 6 inches.
      b. Thermal Break: Centered under door.

C. Push and Pull Handles: Architect selected, custom.

D. Weatherstripping: Manufacturer standard replaceable head and jamb type that meets performance requirements.

E. Interior Door Silencers: Manufacturer standard replaceable resilient type.

2.5 PERFORMANCE

A. Delegated Design:
   1. Delegate exterior storefront system design to manufacturer licensed Professional Engineer.
   2. Deflection: At design wind speed.
      a. Perpendicular to Wall: 1/180 of span, not to exceed 3/4 inch edge of glass deflection.
      b. Parallel to Glass Plane: 1/360 of span, not to exceed 1/8 inch.
   3. Seismic Movement: Design to criteria stated on Structural Drawings.
   4. Wind Movement: Design to criteria stated on Structural Drawings.
   5. Structural Movement: Design to criteria stated on Structural Drawings.

B. Project Codes: Provide storefront, curtain wall and window systems designed for project-specific ASCE 7-22 component and cladding pressures. Comply with requirements of the following codes:
   1. 2023 Florida Building Code (8th Edition).
   2. 2023 Florida Building Code, Energy Conservation (8th Edition).

C. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

D. Structural Loads: Design and size components of curtain wall assembly to withstand loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with SEI/ASCE 7-22 to establish wind pressured based on the following criteria:
   1. Wind Loads: Florida Wind Debris Region.
   2. Ultimate Design Wind Speed (Vult): 154 mph.
   3. Nominal Design Wind Speed (Vasd): As indicated on Drawings.
   4. Occupancy Risk Category: II.
   5. Exposure Category: C.
   6. Internal Pressure Coefficient (GCPE): Plus/minus 0.18.
   7. Other Design Loads: As indicated on Drawings.
   8. Enclosure Classification:
      a. Enclosed for Buildings: Administration and Transfer Building.
      b. Partially Enclosed: Buildings: Maintenance and Bus Wash.

E. Wind-Borne Debris Resistance: ASTM E1996, tested per ASTM E1886.
   1. Missile impact and cyclic pressure for Wind Zone 4.
   2. Florida Outside High Velocity Hurricane Zone product approval.

F. Energy Performance: Certify and label energy performance according to NFRC and as follows:
   1. Provide thermal performance data demonstrating compliance with Climate Zone 2 of the Florida Energy Code., including:
      a. Fixed Fenestration U-Factor: ≤ 0.50.
      b. Solar Heat Gain Coefficient: ≤ 0.25 for South/East/West-facing; ≤ 0.33 for North-Facing openings.
   2. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 66 frame and 66 glazing as determined according to NFRC 500.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
   2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
      b. Low Exterior Ambient-Air Temperature: 0 deg F.
      c. Interior Ambient-Air Temperature: 75 deg F.

H. Acoustic Performance:
   1. OITC: ASTM E90 and ASTM E1332; 30, minimum.

I. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.6 MATERIALS

A. Aluminum: Manufacturer recommended alloy and temper.
   1. Extruded Profiles: ASTM B221.
   2. Sheet and Plate: ASTM B209.
   3. Structural Items: ASTM B308.

B. Steel Reinforcement: Galvanized.
   1. Structural Shapes: ASTM A36.
   2. Cold-Rolled Shapes: ASTM A1008.
   3. Hot-Rolled Shapes: ASTM A1011.

C. Concealed Flashing: Dead soft stainless steel 0.018 inch thick.

D. Assembly Sealants: Silicone.
   1. VOC Content: 250 g/L, maximum.

E. Fasteners: Stainless steel.
   1. Where exposed or semi-exposed, use countersunk flathead screws finished to match adjacent surface.

F. Separation Coating: Bituminous paint; SSPC-Paint 12.

G. Concrete Anchors: Manufacturer recommend expansion or screw anchors.

2.7 FABRICATION

A. Fabricate components for uniform 1/2 inch shim space at jambs and heads.

B. Fabricate joints flush, hairline, and weathertight.

C. Provide internal reinforcements needed for performance requirements.

D. Maintain thermal break of exterior assemblies.

E. Conceal fasteners and attachments from view.

F. Provide flat closure plates for open channel perimeter frame members.

G. Fabricate sheet metal components per SMACNA Architectural Sheet Metal Manual.
   1. Fabricate trim and flashing in lengths to minimize number of joints.
   2. Fabricate trim to uniform sizes and profiles with smooth, flat surfaces free of oil-canning or other distortion.
   3. Fabricate trim for concealed anchorage where possible.

H. Prepare components in shop for door hardware installation.

I. Weep Holes: Round or oblong, manufacturer recommended size; manufacturer recommended

spacing.

J. Provide continuity of drainage for condensation and infiltrated water to system weeps.

K. Glazing Option: Framing and doors may be factory glazed before delivery to Project site.

L. Fabrication Tolerances:
1. Square: 1/8 inch maximum difference in diagonal measurements.
2. Corner, Face Offsets: 1/16 inch maximum.
3. Bow in Framing Members: 1/16 inch maximum.
4. Joints: Hairline at permanent connections, 1/16 inch maximum at removable glazing stops.

2.8 FINISHES

A. Anodizing: AAMA 611 Class I or AAMA 612 with electrodeposition organic seal.
1. Color: Clear.

B. Liquid Color Coating: Two coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.
1. Color: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that adjoining air and water barriers are in place and extend into rough openings beyond location of exterior joint seals.

3.2 PREPARATION

A. Separation Coating: Apply bituminous paint to surfaces that will contact concrete, dissimilar metals, masonry, and preservative-treated wood, or provide other permanent isolation material.

3.3 INSTALLATION

A. Do not install damaged or substandard components, including items that have deficient finishes.
1. Corrections in field are subject to Architect approval before installation.
2. Return components to factory for remanufacturing or refinishing, or provide new components to replace items that cannot be satisfactorily corrected in field.

B. Install steel reinforcement channels between two abutting frames. Anchor channels to

overhead structure and floor.

C. Coordinate attachment and sealing of exterior assemblies to air and water barrier materials to ensure continuity.

D. Install assemblies plumb, level, square, and accurately aligned.

E. Anchor assemblies securely to structural elements.

F. Set sill flashing with two lines of continuous sealant per Section 079200.

G. Install flashing with end dams. Lap joints minimum 6 inches and seal watertight. Secure flashing with non-penetrating anchorages.

H. Fill shim spaces with mineral fiber insulation.

I. Remove debris, dirt, aluminum scraps, and other materials from glazing channels.

J. Doors: Install for smooth operation and weathertight fit.
   1. Hardware: Mount with concealed fasteners.
   2. Set thresholds in continuous bed of sealant or gasketing and fasten rigidly in place so they do not rock or cause noise when walked on.

K. Verify that internal drainage and weeps are fully functional.

L. Glass Installation: Section 088000.

M. Tolerances:
   1. Variance from Plumb, Plane, and Level: 1/8 inch in 10 feet and 1/4 inch in 40 feet, maximum.
   2. Variance in Alignment Between Adjacent Units: 1/16 inch, maximum.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage agency to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Verify that sealants have cured fully before testing.
   3. Perform tests before interior wall finishes installation.

B. Water Spray Test: AAMA 501.2.
   1. Initial Test Location: Architect designated area of storefront.
   2. Additional Locations: Test two additional Architect designated areas during remaining installation period.
   3. Pass Criteria: No water penetration.

C. Water Resistance Testing: AAMA 503.
   1. Initial Test Location: Architect designated area of storefront.

2. Test Pressure: Two-thirds of test pressure specified in Performance article per ASTM E331.
3. Pass Criteria: No water penetration.

D. Air Infiltration Testing: AAMA 503.
1. Locations: Water resistance test locations.
2. Test Pressure: Specified in Performance article.
3. Allowable Leakage: 1.5 times rate specified in Performance article per ASTM E283.

E. Non-Conforming Work: Make corrections or replace, and retest.

3.5 ADJUSTING

A. Adjust doors and door hardware for smooth operation and secure weathertight closure.

B. Adjust door closers per ADA requirements.

C. Adjust operable windows and hardware for smooth operation and secure, weathertight closure.

3.6 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Clean exposed surfaces. Remove excess sealants, and glazing materials.

3.7 PROTECTION

A. Protect storefronts from contaminating substances and glass damage.

END OF SECTION

SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes glazed aluminum curtain walls.
   1. Includes steel reinforced framing to meet local extreme lind loads, windborne depris impact resistance and cyclic pressure changes.

B. Related Requirements:
   1. Section 084113 "Aluminum-Framed Entrances and Storefronts".
   2. Section 088000 “Glazing.”.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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 glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.
   3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

E. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and field testing agency.

B. Digital Photographs: Submit digital photographs to document each step of the installation for all flashing at the first install.

C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
   1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.

E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

F. Source quality-control reports.

G. Field quality-control reports.

H. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area 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.

1.8 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration created by wind and thermal and structural movements.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      d. Water penetration through fixed glazing and framing areas.
      e. Failure of operating components.
   2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design:
   1. Delegate exterior storefront system design to manufacturer licensed Professional Engineer.
   2. Deflection: At design wind speed.
      a. Perpendicular to Wall: 1/180 of span, not to exceed 3/4 inch edge of glass deflection.
      b. Parallel to Glass Plane: 1/360 of span, not to exceed 1/8 inch.
   3. Seismic Movement: Design to criteria stated on Structural Drawings.
   4. Wind Movement: Design to criteria stated on Structural Drawings.
   5. Structural Movement: Design to criteria stated on Structural Drawings.

B. Project Codes: Provide storefront, curtain wall and window systems designed for project-specific ASCE 7-22 component and cladding pressures. Comply with requirements of the following codes:
   1. 2023 Florida Building Code (8th Edition).
   2. 2023 Florida Building Code, Energy Conservation (8th Edition).

C. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

D. Structural Loads: Design and size components of curtain wall assembly to withstand loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with SEI/ASCE 7-22 to establish wind pressured based on the following criteria:
   1. Wind Loads: Florida Wind Debris Region.
   2. Ultimate Design Wind Speed (Vult): 154 mph.
   3. Nominal Design Wind Speed (Vasd): As indicated on Drawings.
   4. Occupancy Risk Category: II.
   5. Exposure Category: C.
   6. Internal Pressure Coefficient (GCPE): Plus/minus 0.18.
   7. Enclosure Classification:
      a. Enclosed for Buildings: Administration and Transfer Building.
      b. Partially Enclosed: Buildings: Maintenance and Bus Wash.

E. Wind-Borne Debris Resistance: ASTM E1996, tested per ASTM E1886.
   1. Missile impact and cyclic pressure for Wind Zone 4.

2. Florida Outside High Velocity Hurricane Zone product approval.
3. Miami-Dade County High Velocity Hurricane Zone product approval.

F. Deflection of Framing Members: At design wind pressure, as follows:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
      a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

G. Structural: Test according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

H. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

I. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.

J. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.
   2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

K. Energy Performance: Certify and label energy performance according to NFRC and as follows:
   1. Provide thermal performance data demonstrating compliance with Climate Zone 2 of the Florida Energy Code., including:
      a. Fixed Fenestration U-Factor: ≤ 0.50.
      b. Solar Heat Gain Coefficient: ≤ 0.25 for South/East/West-facing; ≤ 0.33 for North-Facing openings.

2. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 66 frame and 66 glazing as determined according to NFRC 500.

L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.
c. Interior Ambient-Air Temperature: 75 deg F.

2.2 MANUFACTURERS

A. Product: Subject to compliance with the requirements, provide 1600 Wall System 1 as manufactured by Kawneer North America.
1. With the submission of a substitution request, comparable products by one of the following will be considered.
a. EFCO Corporation.
b. TRACO.
c. Wausau Windows and Wall Systems, Apogee Wausau Group.

B. Source Limitations: Obtain all components of curtain wall system, including framing entrances and accessories, from single manufacturer.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Superior-performance organic finish.
5. Fabrication Method: Either factory- or field-fabricated system.

B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
1. Include snap-on aluminum trim that conceals fasteners.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:
   1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      a. Sheet and Plate: ASTM B 209.
      b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
      c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
      d. Structural Profiles: ASTM B 308/B 308M.
   2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
      a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
      b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
      c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
      d. Structural Steel Tubing (HSS): Hollow structural steel sections inserted inside mullions generally adhere to ASTM A500 (Grade B or C).

2.4 INSULATED INFILL PANELS

A. Insulated Infill Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

B. Product: Subject to compliance with the requirements, provide infill panel by Bunting Architectural Metals or an approved equal product.
   1. Overall Panel Thickness: 1 inch, unless otherwise indicated.
   2. Exterior Skin: Aluminum.
      a. Thickness: Manufacturer's standard for finish and texture indicated.
      b. Finish: Match framing system.
   3. Interior Skin: Aluminum.
      a. Thickness: Manufacturer's standard for finish and texture indicated.
      b. Finish: Matching curtain-wall framing.
   4. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board, extruded-polystyrene board, or expanded-perlite, mineral-insulation board.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.

2.5 ENTRANCES

A. Entrances: Comply with Section 08 41 13 "Aluminum-Framed Entrances and Storefronts."

2.6 GLAZING

A. Glazing: Comply with Section 08 80 00 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
   1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

E. Primers and Coatings: High-performance corrosion protection.
   1. Shop-applied, zinc-rich, corrosion-resistant primer conforming to SSPC-PS Guide No. 12.00.
   2. (Or) Hot-dip galvanizing per ASGM A123.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.

6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Fabricate components to resist water penetration as follows:
1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss: Match Architect's sample.

PART 3 EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.

4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing non-conductive spacers as recommended by manufacturer for this purpose.
2. Connect curtain wall system and its anchorage anchors to the building structure using high-strength stainless steel (Grade 316) fasteners.
3. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 08 80 00 "Glazing."
1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

G. Install weather seal sealant according to Section 07 92 00 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
   a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
   b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
   c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner has engaged a testing agency who will perform testing of the glazed aluminum curtain wall assemblies.
   1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
   2. Test Area: Perform tests on one bay at least 30 feet, by one story.
   3. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
      a. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
         1) Perform a minimum of one test for every 25 daylight openings in areas as directed by Architect. Perform 2 additional tests for any failed test following remediation of defects that allow water penetration.
      b. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
         1) Perform a minimum of two tests in areas as directed by Architect.
      c. Water Penetration: ASTM E 1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration. Perform a minimum one test for every 7,500 sq. ft. of glazed aluminum curtain wall in area(s) as directed by Architect. Perform an additional test for any failed test following remediation of defects that allow water penetration.
   4. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
   5. Prepare test and inspection reports.

END OF SECTION

SECTION 085653

SECURITY WINDOWS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Fixed, ballistic-rated transaction window system.

B. Principal Products:
   1. Factory-fabricated storefront-type transaction and ticket window assembly.
   2. High-security ballistic and windborne-debris-resistant glazing.
   3. Integrated transaction accessories including unamplified natural-voice communication spacers and standard drop-in deal trays.
   4. Installation accessories.

1.2 DEFINITIONS

A. High-Velocity Hurricane Zone (HVHZ): Geographic areas designated by the Florida Building Code subject to extreme wind load and missile impact hazards.

B. Monolithic Security Glazing: Single, non-insulated glazing profiles comprising multi-layered glass and polycarbonate laminates engineered for structural, ballistic, and impact resistance without interior airspace.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate action window and drawer installation with construction of rough openings and air barrier application.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical specifications, structural data sheets, and component profiles.
   1. Transaction windows.
   2. Glass.

3. Speak-thru.
4. Transaction drawers.
5. Initial selection color charts and samples.

B. Shop Drawings.
1. Include layout elevations, precise rough opening interfaces, full anchoring patterns, fastener types, and detailing for perimeter sealant joints, showing the following:
a. Anchorage and support details.
b. Trim details.
c. Glass material identification.

C. Samples:
1. Framing: 12-inches long.
2. Glazing: Manufacturer's standard size.

1.5 INFORMATIONAL SUBMITTALS

A. Quality Assurance Certifications: Submit structural, impact, ballistic, and thermal test documentation confirming performance parameters.
1. Delegated Design: All structural calculations, engineering drawings, and performance submittals must be signed and sealed by a professional engineer licensed to practice in the state where the project is located, as required by the local Authority Having Jurisdiction (AHJ).
2. Provide valid Florida Product Approval (FPA) numbers or Miami-Dade Notice of Acceptance (NOA) documentation.

B. Test and Evaluation Reports: Independent testing agency test results showing:
1. Ballistics rating and test preformed.

C. Field Quality Control Submittals: Field test and inspection reports.

D. Manufacturer Reports: Field instruction, test, and inspection reports.

E. Qualification Statements: Manufacturer and installer.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For ballistics-rated transaction windows and drawers.

B. Warranty Documentation: For ballistics-rated transaction windows and drawers.

1.7 QUALITY ASSURANCE

A. Qualifications:
1. Installers: Transaction window manufacturer certified or approved.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver windows factory-assembled, glazed, and crated to prevent physical damage or contamination.

B. Protect factory finished aluminum surfaces with wrapping and strippable coating.

C. Store materials off the ground in a clean, dry, protected location. Do not stack units horizontally.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.10 WARRANTY

A. Manufacturer Warranty:
   1. Transaction Windows and Drawers: Warrant against product, installation, and total system failure. Special Assembly Warranty: Manufacturer agrees to repair or replace transaction window components that fail in materials or workmanship within specified warranty period.
      a. Failure includes:
         1) Structural.
         2) Welds.
      b. Warranty Period: 2 years.
      c. Dollar Limit: None.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: Ten years.

PART 2 PRODUCTS

2.1 FIXED, BALLISTIC-RATED TRANSACTION WINDOWS

A. Ballistic Rated Transaction Windows: Fixed, framed transaction security windows with framing on four sides.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide:
      a. Kawneer Company, Inc. IR501T Impact-Resistant Storefront Framing System, as Basis-of-Design.
   2. Acceptable Comparable Manufacturers: Subject to compliance with requirements, products by the following manufacturers providing equivalent dimensions, architectural profiles, wind-load capacity, and UL 752 / ASTM impact ratings may be submitted for approval:
      a. Insulgard Security Products – Bulletblock Window & Storefront Framing Systems.
      b. Total Security Solutions (TSS) – Heavy-Duty Exterior Aluminum-Clad Transaction Systems.

2.2 ASSEMBLY & SYSTEM DESCRIPTION

A. Framing Profiles: Extruded aluminum alloy 6063-T6 with a standard 5-inch (127 mm) frame depth and a 2-3/4 inch (69.9 mm) sightline.

B. Thermal Break: Manufacturer’s standard IsoLock™ lanced pour and debridge thermal break separating the exterior and interior aluminum faces.

C. Substrate Integration: System profiles must include heavy-duty perimeter subframes or anchoring channels engineered specifically for mounting into an exterior Concrete Masonry Unit (CMU) block wall.

2.3 GLAZING SYSTEM

A. Glazing Type: High-security monolithic (non-insulated) heavy-duty ballistic glass-clad polycarbonate laminate.

B. Performance Properties: Multi-layer construction engineered to fulfill both UL 752 Level 3 ballistic containment and ASTM E1996 Level D large missile impact protection within a unified single profile. Glazing must not incorporate an insulating air pocket.

2.4 TRANSACTION DEAL TRAY

A. Type: Standard drop-in deal tray flush-mounted into the counter deck.

B. Dimensions: 12" Wide x 8" Deep x 2" High.

C. Fabrication: Formed from minimum 16-gauge, Type 304 stainless steel with an architectural

satin finish.

D. Security Shielding: Backed by integrated, underlying sub-counter ballistic steel plating matching or exceeding the UL 752 Level 3 rating of the surrounding window assembly.

2.5 BALLISTICS RESISTANT SPEAK-THRU

A. Passive Speak-Thru Device: Natural voice, cast stainless steel speaker assembly for 5 inch diameter openings.

B. Dimensions: 6 inch diameter cast stainless steel with 1/4 inch offset.

C. Finish: No. 3 satin stainless steel.

2.6 PERFORMANCE

A. Structural Performance: Framing and glazing assemblies shall be engineered to withstand project-specific Component and Cladding wind pressures calculated in strict accordance with ASCE 7-22 based on the following criteria:
   1. Ultimate Design Wind Speed (\(V_{ult}\)): 154 mph.
   2. Exposure Category: C.
   3. Risk Category: II.

B. Windborne Debris & Hurricane Resistance: Assemblies shall be certified and tested to comply with the Florida Building Code Windborne Debris Region requirements under the following standards:
   1. ASTM E1886 and ASTM E1996 Standard Test Methods.
   2. Impact Core Rating: Large Missile Impact, Level D (9-pound 2x4 projectile traveling at 34 mph / 50 feet per second followed by 9,000 positive/negative pressure cycles).

C. Ballistic Resistance: Complete assembly, including the frame perimeter, glass pane, and joint interspaces, shall be tested and certified by an independent laboratory to meet UL 752 Level 3 Ballistic Resistance (.44 Magnum handgun protection, non-spalling).

D. Forced Entry Resistance: Certified compliance with ASTM F588 Grade 40 static and dynamic load testing protocols.

E. National Fenestration Rating Council (NFRC) Thermal Thresholds: System shall provide verified thermal modeling indicating compliance with the following limits:
   1. Thermal Transmittance: U-Factor ≤ 0.50.
   2. Solar Heat Gain Coefficient (SHGC): ≤ 0.25 for South, East, and West exposures.
   3. Solar Heat Gain Coefficient (SHGC): ≤ 0.33 for North exposures.

F. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.7 ALUMINUM FINISHES

A. Anodized Finish: Kawneer Permanodic Anodized Finish (Color as selected by Architect from manufacturer's standard range).

2.8 MATERIALS

A. Aluminum Extrusions: ASTM B221.

B. Aluminum Sheet: ASTM B209.

C. Assembly Sealants: Silicone.
   1. VOC Content: 250 g/L maximum.

D. Fasteners: Stainless steel.
   1. Where exposed or semi-exposed, use countersunk flathead screws finished to match adjacent surface.

E. Separation Coating: Bituminous paint; SSPC-Paint 12.

F. Concrete Anchors: Group 1 stainless steel expansion anchors.

2.9 FABRICATION

A. Fabricate security windows and drawers to provide a complete system for assembly of components and anchorage.

B. Fabricate joints flush, hairline, and weathertight.

C. Provide internal reinforcements needed for loading requirements and anchorage to substrate.

D. Conceal fasteners and attachments from view.

E. Separation Coating: Apply bituminous paint to surfaces that will contact concrete, dissimilar metals, masonry, and preservative-treated wood, or provide other permanent isolation material.

F. Glazing: Factory glazed.

G. Fabrication Tolerances:
   1. Square: 1/8 inch maximum variation in diagonal measurements.
   2. Corner, Face Offsets: 1/32 inch maximum.
   3. Bow in Framing Members: 1/16 inch maximum.
   4. Joints: Hairline at permanent connections, 1/32 inch maximum at removable glazing stops.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the exterior CMU block wall rough openings are square, plumb, and within a maximum tolerance of ± 1/8 inch.

B. Confirm that adjacent CMU cells are properly filled with structural grout and structural reinforcement bars to securely anchor the assembly.

C. Do not proceed with installation until all substrate discrepancies have been resolved.

3.2 PREPARATION & INTERACTION ISOLATION

A. Clear mortar droppings, sealants, dust, and moisture from all rough opening surfaces.

B. Galvanic Corrosion Prevention: Apply a heavy coat of bituminous paint, zinc-chromate primer, or high-density non-conductive elastomeric separation tape to all aluminum framing surfaces that will come into direct contact with CMU masonry, mortar, concrete, or bare steel structural anchor plates.

C. Install in accordance with manufacturer's instructions.

D. Attach transaction windows and shims to perimeter opening to accommodate construction tolerances and other irregularities.

E. Install plumb and level, free of warp or twist.

F. Maintain dimensional tolerances and alignment with adjacent work.

G. Fill shim spaces with mineral fiber insulation.

H. Install perimeter sealant per Section 079200.

3.3 INSTALLATION

A. Position and install the factory-fabricated window assembly using screw-spline or framing methods matching the manufacturer's certified engineering drawings.

B. Maintain framing plumb, level, square, and true to architectural grid lines.

C. Anchoring: Rigidly anchor the subframe to the core grout-filled CMU cells utilizing heavy-duty masonry fasteners (e.g., Tapcon anchors or expansion shields) engineered and spaced to transfer full 154 mph ASCE 7-22 wind forces directly into the core building structure.

3.4 PRIMETER SEALING & WEATHERPROOFING

A. Establish a uniform, nominal 1/2-inch perimeter joint width between the aluminum frame and the rough masonry opening.

B. Pack structural voids around the perimeter with closed-cell backer rods or insulation to establish appropriate backing depth for the sealant.

C. Apply a continuous bead of high-performance exterior-grade structural silicone sealant around the exterior frame-to-masonry joint to form an airtight, water-tight perimeter weather envelope across the full 1/2-inch joint.

D. Tool sealant beads immediately to achieve a smooth, clean finish.

3.5 ADJUSTING CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Inspect the drop-in deal tray to ensure it sits perfectly flush with the counter bed and lacks sharp margins or pinch hazards.

C. Wash metal and glass surfaces using clean water and mild, non-abrasive cleaners. after installation and shortly before Substantial Completion inspection.

D. Completely remove protective tape, alignment labels, and stray sealant residue before final inspection.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following swinging doors:
   a. Hollow metal.
   b. Flush wood.
   c. Swing gates.
   d. Sliding gates.
2. Key cylinders for doors specified in other Sections.
3. **Electrified access control door hardware. See Door Hardware Schedule and Door-Set Numbering Index (this Section) for hardware sets prefixed with "E". See electrical specifications for electrical work and materials required.**
4. **Low-energy ADA automatic door operators requiring electrical work and materials, and installation by AAADM certified installer.**

B. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Permanent key cylinder cores to be installed by Owner.

1.2 SUBMITTALS

A. Number of Submittals: All items listed in this section are to be included in one submittal prepared by one Supplier.

B. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Details of electrified door hardware, indicating the following:

1. **Factory-drawn Wiring Diagrams: Hardware submittals without these diagrams will be rejected without review. Power, signal, and control wiring. Include the following:**
   a. System schematic.
   b. Point-to-point wiring diagram identifying specific termination points for all electrified hardware items.
   c. Riser diagrams indicating number of conductors and wire gauges required.
   d. Elevation of each door indicating where items are located with respect to which side of opening, dimension above floor, and lateral and vertical distances from opening.
   e. Product schematics.
2. Detail interface between electrified door hardware and access control system.
3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

D. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware as requested by Architect.

E. Samples for Verification: For exposed door hardware of each type, in specified finish, full size, as requested by Architect. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

F. Qualification Data:

1. Finish Hardware Installers
   a. Finish hardware, including electrified hardware, for wood, hollow metal, and aluminum doors to be installed by personnel trained and certified by the manufacturer of the product furnished.
   b. Provide manufacturer's certificates for installer as part of Contractor's bid information. Failure to supply certificates may result in rejection of bid.
2. Hardware Supplier
   a. Established contract hardware firm which maintains and operates an office, display, and stock in project area and which is a factory authorized distributor of the lock being furnished.
   b. Hardware scheduled and furnished by or under direct supervision an Architectural Hardware Consultant.
   c. All schedules submitted to the Architect for approval and job use must carry the signature and certified seal of this Architectural Hardware Consultant.
3. Architectural Hardware Consultant
   a. Currently certified by the Door and Hardware Institute.
   b. Full-time employee of the Hardware Supplier or an individual having no contractual ties to any supplier/manufacturer entity.
   c. Available at reasonable times to Architect, Owner, and Contractor during course of work.
4. Automatic Door Operator Supplier
   a. Established automatic operator distribution and installation firm which maintains and operates an office, display, and stock in project area and which is a factory authorized distributor of the automatic operator being furnished.
   b. Currently certified by AAADM to install both high and low energy automatic door operators.
   c. All schedules submitted to the Architect for approval and job use must include copies of the distributors factory authorization to distribute and install their operators and AAADM certification to install both high and low energy automatic door operators.

G. Maintenance Data: For each type of door hardware. Include final hardware schedule, keying schedule, riser diagrams, and point-to-point wiring diagrams in 3-ring binder, labeled on spine with project name and "Door Hardware".

H. Warranty: Special warranty specified in this Section.

I. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of a DHI certified Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

   a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule"; other formats will be rejected without review. Double space entries, and number and date each page.
   b. Numerical Sequence of Sets and Headings: Submittal headings shall be in exact order as hardware sets in specification: one heading only per set. Submittal set numbers shall relate to specification set numbers, ie. if three headings are required for Set 12 due to door width differences, then the heading numbers should be 12.1, 12.2, and 12.3 or employing similar linking logic.
   c. Door Numbers: Identical to those used in the contract documents.
   d. Number of Copies: (5).
   e. Content: Include the following information:

      1) Identification number, location, hand, fire rating, and material of each door and frame.
      2) Type, style, function, size, quantity, and finish of each door hardware item.
      3) Complete designations of every item required for each door or opening including name and manufacturer.
      4) Degree of opening for closer and overhead stop and holder installation.
      5) Keying information.
      6) Fastenings and other pertinent information.
      7) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      8) Explanation of abbreviations, symbols, and codes contained in schedule.
      9) Mounting locations for door hardware.
      10) Notes included with specification hardware sets <u>transcribed verbatim</u> into submittal hardware sets.
      11) Door and frame sizes and materials.
      12) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
         a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
      13) List of related door devices specified in other Sections for each door and frame.

   f. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.3 QUALITY ASSURANCE

A. Furnish proper hardware types and quantities for door function, hardware mounting and clearances, and to meet applicable codes. Bring discrepancies to the attention of the Architect a minimum of (10) days prior to bid date so that an addendum may be issued. No additional compensation will be allowed after bidding for hardware changes required for proper function, hardware mounting or clearances, or to meet codes.

B. 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.

C. Source Limitations: **All items listed in hardware sets are to be furnished by one supplier**. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. 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.

D. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
3. NFPA 101: Comply with the following for means of egress doors:
   a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Thresholds: Not more than 1/2 inch high.
4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to

authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
a. Test Pressure: Positive pressure labeling.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Conference is to include representatives of the Owner, Architect, Contractor, CM if applicable, Hardware Supplier, and Manufacturer of Key Cylinders. Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Access Control Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Conference is to include representatives of the Owner, Architect, Contractor, CM if applicable, and Access Control (or Security) Supplier. Access control conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future access control system expansion.
3. Requirements for access control storage of credentials and software.
4. Assignment and distribution of permanent access control credentials, badging equipment, and software.
5. Access control privilege assignments including doors, time schedules, users, user groups, special credential functions, etc.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), Systems Integrator(s), and Contractor(s) to review proper methods and procedures for receiving, handling, and installing door and access control hardware to manufacturer's recommendations and according to specifications.

1. Prior to installation of door hardware, arrange for manufacturers' representatives to hold a project specific training meeting on the proper installation and adjustment of their respective products. Product training to be attended by the installers of standard and access control door hardware for the aluminum, hollow metal and wood door sections. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Deliver hardware for aluminum doors to GC in timely manner so as not to delay fabrication of aluminum doors and frames. Balance of hardware may be delivered to GC at same time, packaged separately from aluminum door hardware, and may be billed as stored materials.

C. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

D. Deliver keys to Owner by registered mail or overnight package service. Obtain Owner's contact name and address from Architect.

1.5 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Distribute templates in a timely manner so as not to delay suppliers. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, and security system.

1.6 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Seven years for heavy duty cylindrical (bored) locks and latches.

2. Five years for standard duty cylindrical (bored) locks and latches.
3. Five years for exit hardware.
4. Ten years for manual door closers.
5. Two years for electromechanical and integrated access control door hardware.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide (6) months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

1.8 EXTRA MATERIALS

A. Furnish full-size units of door hardware 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. Door Hardware:
   a. (2) complete closers (heavy duty parallel arm)
   b. (1) classroom locksets
   c. (5) rim key cylinders

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

B. Designations: Requirements for design, grade, function, material, 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:

1. 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. References to BHMA Standards: In addition to other requirements in this section, provide products complying with or exceeding these standards and requirements for description, quality, and function.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electrified access control door hardware, in compliance with specifications, must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01 "Substitution Procedures". Approval of requests is at the discretion of the architect, owner, and their designated consultants.

D. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include manufacturers specified.

2.2 BUTT HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Height, Width, and Weight: Unless otherwise indicated, provide the following:

1. Doors with Exit Devices or 3’6” or more in width: 5” high, heavy-weight hinges.
2. Doors less than 3’6” in width: 4-1/2” high, standard-weight hinges.
3. Width: 4-1/2” heavy-weight, 4" standard-weight, unless proper clearance requires a different width.
4. Doors with Closers: Antifriction-bearing hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior and in-swinging restroom door hinges: Stainless steel, with stainless-steel pin.
2. Balance of hinges: Steel, with steel pin.

E. Hinge Options: Provide the following:

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for reverse bevel lockable doors.
2. Corners: Square.
3. Number of knuckles: Five.

F. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

G. Template Hinge Dimensions: BHMA A156.7.

H. Available Manufacturers:

1. Hager Companies (HAG).
2. McKinney Products Company; an ASSA ABLOY Group company (MCK).
3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
4. PBB, Inc. (PBB)

2.3 CONTINUOUS HINGES

A. Provide hinge of general series as indicated in hardware sets and of proper shape and model to suit door and frame configuration.

B. Continuous, Pinless-Type Hinges: Extruded-aluminum, pinless, hinge leaves; with concealed, self-lubricating thrust bearings.

1. Available Manufacturers:

a. Hager Companies (HAG).
b. IVES Hardware; an Allegion Company (IVE).
c. Architectural Builders Hardware (ABH).
d. Select Products Limited (SPL).
e. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.4 ELECTRIC STRIKES

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Acceptable Manufacturers:

a. HES (HES) - 1006 Series.
b. Security Door Controls (SDC) - 55 Series.
c. Von Duprin (VON) - 6000 Series.
d. Trine (TRN) - 4100 series.
e. Camden (CAM).

B. Surface Mounted Rim Panic Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available

for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Acceptable Manufacturers:

    a. HES (HES) - 9500/9600 Series.
    b. Trine (TRN) - 4850 Series.
    c. Von Duprin (VON) - 6300 Series.
    d. Security Rim Security Door Controls (SDC) - 30 Series.
    e. Camden (CAM).

C. Provide electric strikes with in-line (MOV) surge suppressors.

2.5 ELECTRONIC ACCESSORIES

A. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

1. Acceptable Manufacturers:

    a. Security Door Controls (SDC).
    b. Securitron Door Controls (SEC).
    c. Architectural Control Systems (ACS).
    d. Dortronics (DOR).

B. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

1. Acceptable Manufacturers:

    a. Security Door Controls (SDC).
    b. Securitron Door Controls (SEC).
    c. General Electric Security (GES).
    d. Honeywell (HNW).

C. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing are mortised into the frame and are attached with screws. Surface mounted models include wide gap distance design complete with armored flex cabling. SPDT or DPDT contacts as specified.

1. Acceptable Manufacturers:

    a. Security Door Controls (SDC).
    b. Securitron Door Controls (SEC).
    c. Architectural Control Systems (ACS).
    d. George Risk Industries (GRI).

D. Electronic Power Transfers:

1. Concealed: For new doors and frames, concealed when door is closed. All metal construction, cast housing with steel backboxes, two universal joints and rigid tubing. Acceptable Manufacturers:

a. Security Door Controls (SDC).
b. Securitron Door Controls (SEC).
c. Architectural Builders Hardware (ABH).
d. Hager (HAG).
e. Von Duprin (VON).

2.6 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. 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 (22 N).

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Trim:

1. Levers: Cast.
   a. Schlage Rhodes model.
2. Roses: Forged.
3. Lockset Designs: Provide design indicated in hardware sets, or, if sets are provided by another manufacturer, provide designs that match those designated.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.

E. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.

2.7 MECHANICAL LOCKS AND LATCHES

A. Lock Types: Provide mortise or bored locks as indicated by model number in the Hardware Schedule.

B. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Bored Locks: BHMA A156.2.

C. Bored Locks: BHMA A156.2 Grade 1.

1. Available Manufacturers:

a. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SAR).
b. Schlage Commercial Lock Division; an Allegion Company (SCH).
c. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

D. Compatibility with Key Cylinders: fully warranted for use with key cylinder furnished.

2.8 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

B. Manual Flush Bolts: BHMA A156.16, Grade 1; designed for mortising into door edge.

1. Available Manufacturers:

a. Door Controls International (DCI).
b. Glynn-Johnson; an Allegion Company (GLY).
c. Rockwood Manufacturing Company (ROC).
d. Trimco (TRI).

2.9 EXIT DEVICES

A. Exit Devices: BHMA A156.3, Grade 1.

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. 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 (22 N).

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Removable Mullions

1. BHMA A156.3.
2. Key removable.
3. Provide head cap spacers, angle brackets, and other mounting accessories as needed for proper mounting, and anchoring and support of screws, as needed for top jamb configuration.
4. Provide mullion stabilizer sets for mullions at exterior openings.

G. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

1. Operation: Rigid.

H. Outside Trim: As specified in hardware sets; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

I. Fasteners. Manufacturer’s standard, except furnish sex bolts for attachments to doors.

J. Shims: Provide shims if needed for clearance.

K. Available Manufacturers:

1. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SAR).
2. Von Duprin; an Allegion Company (VON).

2.10 KEY CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1.

B. Cylinders: Provide cylinders for all devices requiring key cylinders to properly function: constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six or seven as directed by Owner.
2. Keyway: Patented or non-patented as directed by Owner.
3. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
4. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
5. Bored-Lock Type: Cylinders with tailpieces to suit locks.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Small-format Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 6 construction master keys.
2. Construction Cores: Provide construction cores that are replaceable by permanent cores for locking devices on exterior doors plus (4) extra. Provide 6 construction master keys.

a. Replace construction cores with permanent cores as directed by Owner.
b. Furnish permanent cores to Owner for installation.

E. Supplemental Items: Provide cylinder spacers, collars, and correct cams as needed for proper function of locking devices.

F. Available Manufacturers:

1. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SAR).
2. Schlage Commercial Lock Division; an Allegion Company (SCH).
3. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

2.11 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: Provide the following:

a. Cylinder Change Keys: Three per cylinder.
b. Master Keys: Six per master.
c. Grand Master Keys: Six.
d. Great-Grand Master Keys: Five.
e. Control Keys: Two.
f. Construction Control Keys: Two.

2.12 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
2. Locate and mount per direction of Architect.

B. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook.

1. Available Manufacturers:

a. Lund Equipment Co., Inc. (LUN).
b. MMF Industries (MMF).
c. Telkee; a division of Sunroc Corporation (TEL).

C. Key Control Software: Provide Owner with (1) copy of key control software (basis of design: Medeco Key Wizard)

1. Available Manufacturers:

a. Best (BES).
b. Corbin-Russwin (COR).
c. Medeco (MED).
d. Schlage (SCH).

2.13 FIRE DEPARTMENT KEY BOX

A. Provide (1) fully recessed hinged fire department key box per building.

1. Basis of specification: Knox-Box Model 3200 x RMK x Aluminization x Black.
2. Available Manufacturers:
   a. Knox Company.
   b. Approved equal.

B. Locate in exterior wall as directed by Architect.

2.14 OPERATING TRIM

A. Materials: Fabricate from stainless steel, unless otherwise indicated.

B. Dimensions: All dimensions, shapes, fasteners, and other properties identical to models specified in hardware sets.

C. Push Plates:

1. 0.125" thick, Type 304 solid stainless steel, 4" or 8" wide as indicated by model number in hardware sets, 16" high (unless stile width requires different width), heavy bevel all (4) edges, 3/8" radius rounded corners, factory prepped for key cylinders and thumb-turns as required.
2. Dimensions:
   a. Top of plate to horizontal centerline of key cylinder: 5".
   b. Horizontal centerline of key cylinder to horizontal centerline of thumb-turn: as required per dimension of lock model.
   c. Lock-side edge of plate to vertical centerline of key cylinder: 2".

D. Pull Plates:

1. Plate: 0.050" thick, 4" wide x 16" high (unless stile width requires different width), bevel all (4) edges, 3/8" radius rounded corners, factory prepped for key cylinders and thumb-turns as required.
2. Grip: 1" wide, 8" CTC, Type 304 solid stainless steel, half-moon profile.
3. Dimensions:
   a. Top of plate to horizontal centerline of key cylinder: 2".
   b. Horizontal centerline of key cylinder to horizontal centerline of thumb-turn: as required per dimension of lock model.
   c. Edge of plate to vertical centerline of key cylinder and grip: 2".
   d. Top of plate to horizontal centerline of grip: 10".

E. Available Manufacturers:

1. Hager Companies (HAG).
2. Rockwood Manufacturing Company (ROC).
3. Trimco (TRI).

2.15 SURFACE CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

C. Fasteners: Manufacturer’s standard for arms, shoes and brackets. Sex bolts for fastening closers to doors.

D. Mounting Accessories: Provide shoes, brackets, drop plates, spacers, etc., as needed for proper mounting of closers and arms to door and frame.

1. **At openings with hollow metal or wood doors in hollow metal frames requiring jamb seals and parallel arm closers, provide 1/4" high or 7/8" high closer arm bracket spacers per the frame stop width for the installation of the critical fifth screw for the arm bracket to the top jamb.**

    a. Spacers: 1/4" or 7/8" H, 0.625" OD, 0.281" ID countersunk 0.06", deburred outside edges, grooved (0.032"W x 0.032" D) at 1/8" increments for field cutting, solid 6061 aluminum.
    b. Basis of Design: Cohni Manufacturing (COH), Elyria, OH (ph: 234-206-1540, www.cohni.com), Screw Spacer Combo Pack (has both 1/4" H and 7/8" H models included), Model S-62-CP-25S.

E. Spring Size of Units: Provide field-sizable closers, adjustable for spring sizes 1-6, plus 50% extra spring power at spring size 6, to meet field conditions and requirements for opening force.

F. Cylinders: 1-1/2" minimum diameter; cast iron or high-silicon alloy aluminum.

G. Mounting Configuration: Unless otherwise indicated by model number in the hardware sets:

1. Do not furnish closers capable of being mounted on the corridor side of doors.
2. Do not furnish regular arm closers in areas accessible to students.
3. If tri-pack closers are furnished for regular arm applications, remove parallel arm shoe from closer box before delivering to job.
4. Parallel Arm closers are to be manufacturer's double forged rigid models.

H. Available Manufacturers and Series for Rack and Pinion Surface Closers:

1. LCN Closers; an Allegion Company (LCN): 4040XP series.

2.16 AUTOMATIC DOOR OPERATORS

A. Standard: Set up operator to comply with Low Energy BHMA A156.19 standard. Operator shall also be capable of complying with High Energy BHMA A156.10 standard with no additional equipment required other than safety sensors.

B. Performance Requirements:

1. Not more than 15 lbf (67 N applied)1 inch (25 mm) from latch edge of door to prevent stopped door from opening or closing.
2. If power fails, not more than 30 lbf (133 N applied)1 inch (25 mm) from latch edge of door to manually set door in motion.
3. **Warranted for use on out-swinging exterior doors with the use of a supplemental stop.**

C. Operation: Power opening and spring closing; **power closing to get door latched when encountering resistance**. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

D. Operating System: Electromechanical.

E. Microprocessor Control Unit: Solid-state controls.

F. Features:

1. Adjustable opening and closing speed.
2. Adjustable opening and closing force.
3. Adjustable backcheck.
4. Adjustable latch speed.
5. Adjustable hold-open time of not less than 0 to 30 seconds.
6. Adjustable time delay.
7. Adjustable acceleration.
8. Obstruction recycle.
9. **Provide lock interface relay when not specified as part of locking device power supply.**

G. Mounting: Surface mounted to top jamb.

H. Mounting Accessories: Provide shoes, brackets, drop plates, spacers, etc., as needed for proper mounting of operators and arms to door and frame.

I. Bollards:

1. Of material, size, configuration and shape indicated.
2. Material: Stainless steel.
3. Available Manufacturers for Bollards:

    a. Wikk Industries.

J. Actuators:

1. Wall Push-Plate Switch: Semiflush, wall-mounted, door control switch; of material, size, and shape indicated; mounted in recessed junction box. Provide engraved message as indicated.
2. Material: Stainless steel.
3. Message: International symbol of accessibility and "Push to Open."
4. Available Manufacturers for Actuators:

    a. BEA (BEA).
    b. Wikk Industries.

K. Automatic Door Operator Signage:

1. Comply with BHMA A156.19.
2. Consult Architect before applying signage to door.

L. Available manufacturers for Automatic Door Operators:

1. Dorma; ED400 series. (DRM).
2. LCN Closers; an Allegion Company (LCN); Senior Swing series.
3. Stanley Commercial Hardware; Div. of The Stanley Works (STH); Magic Force series.

2.17 PROTECTIVE TRIM UNITS

A. Size:
   1. Width
      a. Singles, and pairs with removable mullions or surface applied astragals: 2 inches (38 mm) less than door width on push side and 1 inch (13 mm) less than door width on pull side
      b. Other pairs: 1 inch (13 mm) less than door width
   2. Height: as specified in door hardware sets; or, if constrained by door bottom rail height, 1" less bottom rail height.

B. Fasteners: Manufacturer's machine or self-tapping countersunk screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled 4 sides; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel.

D. Available Manufacturers:

   1. Hager Companies (HAG).
   2. Rockwood Manufacturing Company (ROC).
   3. Trimco (TRI).

2.18 MECHANICAL WALL AND FLOOR STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1.

   1. Provide wall stops for doors unless floor, overhead, or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Provide floor stops (and spacers if needed) of proper height and configuration to accommodate floor condition. Where floor or wall stops are not appropriate, provide overhead holders.
   2. Properties. Cast construction with fastener suitable for wall or floor condition.
   3. Available Manufacturers:
      a. Hager Companies (HAG).
      b. Rockwood Manufacturing Company (ROC).
      c. Trimco (TRI).

B. Wall and Floor mounted Combination Door Stops and Holders: BHMA A156.16, Grade 1.

   1. Properties: Heavy cast with adjustable holding force, self-compensating for changes up to ¼" in vertical door position. **Provide flush spacers finished to match adjoining substrates for clearance as needed.**
   2. Manufacturer and Model: Trimco 1283.

2.19 OVERHEAD STOPS AND HOLDERS

A. BHMA A156.8, Grade 1. Template for maximum degree of opening before encountering obstruction.

B. Available Manufacturers:

1. Architectural Builders Hardware Mfg., Inc. (ABH).
2. Glynn-Johnson; an Allegion Company (GLY).
3. Hager (HAG).
4. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).

2.20 SILENCERS

A. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

B. Available Manufacturers:

1. Glynn-Johnson; an Allegion Company (GLY).
2. Hager Companies (HAG).
3. Rockwood Manufacturing Company (ROC).
4. Trimco (TRI).

2.21 DOOR GASKETING

A. General: Provide continuous weather-strip gasketing on exterior hollow metal doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners as indicated by models in hardware sets.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. If hardware is to be attached to the frame and would interfere with the gasketing, then provide hardware compatible gasketing that does not need to be cut for the mounting of hardware.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Mullion Gasketing: Fasten to mullions, forming seal when doors are closed.
4. Sweeps: Apply to bottom of in-swinging exterior hollow metal doors, or as required for sound attenuation, forming seal with threshold or floor when door is closed.
5. Seals integral to threshold at out-swinging exterior hollow metal doors.

B. Requirements per type of rated door provided (these requirements supersede models indicated in hardware sets):

1. Category A wood doors: provide models indicated in hardware sets.
2. Category B wood doors: provide Category G&H seals at jambs and meeting edges. If Category H seals are indicated in hardware sets, provide Cat G seals in addition to the Category H seals.
3. Category A and B hollow metal doors: provide models indicated in hardware sets.

C. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 or UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

G. Mullion Gasketing: Sealing up to 1/4" gaps, 4 vanes, adhesive backed, collapsible to 1/32", black. Basis of Design: DHSI (DHS) Model MS-SA/75 x BK.

H. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

I. Jamb Gasketing Materials:
1. Adhesive Seals. As specified in hardware sets or approved equal.
2. Intumescents: As required.
3. Screwed-on weatherstrip and sweeps. Polyurethane.
4. Panic type thresholds. Polyurethane.

J. Available Manufacturers for Jamb Gaskets (provided they provide items with polyurethane inserts):

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Legacy Manufacturing (LEG).

2.22 THRESHOLDS

A. Standard: BHMA A156.21

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.

D. Fasteners: ¼-20 machine screws and expansion anchors.

E. Gasketing material: At panic-type thresholds: polyurethane.

F. Available Manufacturers (provided they provide items with polyurethane inserts):

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Legacy Manufacturing (LEG).

2.23 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.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, 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. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Manufacturer's standard, except as noted in product sections of this specification. Provide Rivnuts for the fastening of surface-mounted items to existing door frames.

2.24 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

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 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: Comply with DHI A115 Series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

C. Hardware Compatible Jamb Seals: Where push side mounted closers are utilized on doors with hardware compatible top jamb seals, lower the closers by 1/4" from standard frame-referenced dimension. Where rim exit device strikes are mounted directly to side jamb seals, increase standard frame-referenced backset by 1/4".

D. Provide Rivnuts for the fastening of surface-mounted items to existing door frames.

3.3 INSTALLATION

A. Low-energy Automatic Door Operators:

1. **Installer is to have current AAADM certification to install automatic door operators and actuating systems.**

B. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Pulls: locate pulls as directed by Architect.
4. Push Plates: Top edge of plate: 53"AFF.
5. Pull Plates: Top edge of plate: 50" AFF. Centerline of Grip: 40" AFF.
6. Key Cylinders for Auxiliary Deadbolts: 48" AFF.

C. Mounting Locations:

1. Floor Stops and Holders: Locate at least 20" out from hinge edge of door for maximum degree of opening before door encounters obstruction.
2. Wall Stops: Locate so that lockset spindle and wall stop share horizontal and vertical centerlines.
3. Wall Stop/Holders: Locate 4" down and in from top lock-edge corner of door w/holder slot at bottom of unit.
4. **Closers and Overhead Stop/Holders: Template and mount closers and overhead stops for maximum degree of opening before door encounters obstruction or so as to interface with specified wall stops and holders. When used with closers, template and locate overhead stops so that closer arm does not fully extend and bottom out. These functionality requirements override any degree of opening information in the specifications or submittals. Also see 087100-3.2.C for special locations due to seal-mounted hardware.**

5. **Rim Strikes for Exit Devices: Where rim exit device strikes are mounted directly to side jamb seals, increase standard frame-referenced backset by 1/4".**

D. 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 work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule. Document cross-indexing per manufacturer's instructions.

F. **Weatherstrip and Gasketing with Metal Retainers: Fit up as needed for neat appearance with no gaps between retainers or bulbs. Do not cut seals for the installation of hardware; mount hardware directly to the seals.**

G. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants." **Position for complete seal with bottom of doors with no penetration of air or daylight.**

3.4 FIELD QUALITY CONTROL

A. Provide Door Hardware Inspection Services and Field Quality Report as indicated below.

B. Door Hardware Inspection Services

1. Scope
   a. Inspection of all swinging doors and door hardware immediately following completion of installation.
   b. Inspector to furnish a Field Quality Report, itemized per each individual opening, to the Architect within 7 days of the inspection, including:
      1) deficiencies in workmanship and standard industry practices,
      2) use of allowable products,
      3) use of manufacturer recommended fasteners,
      4) compliance with the ADA,
      5) proper door/frame/hardware clearances,
      6) problems related to function, security, aesthetics or maintenance.
2. Inspector Qualifications
      1) Certified Architectural Hardware Consultant.
      2) Entirely independent of the supply side of the project, having no familial or financial relationship with any manufacturer, manufacturer's representative, distributor, installer or supplier used on this project.
      3) Approved by Architect. Go to http://www.dhi.org/ for searchable list of local Architectural Hardware Consultants.
      4) Same Inspector for re-inspections as for the initial inspection.

3. Payment for the inspection and subsequent re-inspections until work is complete and approved is to be made directly by the Contractor to the Inspector within 30 days of receipt of report and invoice.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

B. Overhead Stops/Holders: Set adjustable stops for maximum degree of opening before door encounters obstruction. Adjust friction to control door.

C. Wall and Floor Mounted Stop/Holders: Adjust holding force with spanner head wrench so that door is held securely, yet is easy to pull out of hold open.

D. Door Closers:

1. Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
2. Adjust latch period so that door does not slam nor injure fingers.
3. Adjust spring power so that door properly latches.
4. Adjust backcheck to slow door down before hitting stop point so as to prevent damage to closer, arm, door, frame, and fasteners.

E. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DOOR HARDWARE SCHEDULE

HARDWARE SET PREFIX KEY:
A Indicates Auto Operator.
E Indicates Electronic Hardware.

No prefix indicates mechanical hardware only.

Hardware Set AE01

Non-electrified Items:

(2)	Continuous Hinge	SL11HD	628	SEL
(1)	Key Removable Mullion	KR-4954 x 154 x Angle Bracket	689	VON
(1)	Offset Pull	7191-14 x N-MD Mtg	630	TRI
(1)	NS Panic Device, Rim, 01	LD33A-EO	630	VON
(1)	NS Panic Device, Rim, 03	LD33A-NL-OP	630	VON
(2)	Rim Cylinder	SFIC 6-pin	626	SCH
(2)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN
(1)	Cat H Adhesive Mullion Seal/Mute	MS-SA/75	BRN	DHS
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Note 2: Jamb seals and meeting edge seals by aluminum door supplier.

Electrified Items:

(1)	Rim Panic Electric Strike	4850	630	TRN
(1)	Mullion Wire Harness	MWH-5		TRN
	Note: Drill mullion headcap and top jamb for pass through of wires and harness for easy wire disconnect			
(1)	Operator Bollard		630	WIK
	Note: Provide 6" x 6" square satin stainless steel in-ground mount bollard post factory with welded sloped top sloped away from the actuator, factory prepped for a single-gang actuator at 36" AFF and a single gang access control prep above it at 44" AFF with a weather shroud above the access control prep. Locate bollard exterior as directed by Architect.			
(1)	Elect Automatic Door Operator	Senior Swing x 8310-806R	628	LCN
	Note: Locate On/Off/HO switch on underside of operator housing.			
(2)	Actuator, Sng-gng	S-SG-3-WR	630	WIK
(1)	PIR Motion Sensor	MD31D-B	Black	SDC
	Note: Locate centered on top jamb.			
(2)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key or card. Presenting card releases electric strike and enables pull side actuator. Pressing pull side actuator signals operator to open RHR door leaf. Door closes and relocks after time delay. Pressing push side actuator releases electric strike and signals operator to open RHR door leaf. Door closes and relocks after time delay. Doors are monitored for request to exit and door position.

Hardware Set AE02

Non-electrified Items:

(2)	Continuous Hinge	SL11HD	628	SEL
(2)	Offset Pull	7191-14 x N-MD Mtg	630	TRI
(2)	Dummy Panic Bar	330	630	VON
(1)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN

Note 1: Jamb seals and meeting edge seals by aluminum door supplier.

Electrified Items:

(1)	Operator Bollard		630	WIK
	Note: Provide 6” x 6” square satin stainless steel in-ground mount bollard post factory with welded sloped top sloped away from the actuator, factory prepped for a single-gang actuator at 36” AFF. Locate bollard interior as directed by Architect.			
(1)	Elect Automatic Door Operator	Senior Swing x 8310-806R	628	LCN
	Note: Locate On/Off/HO switch on underside of operator housing.			
(2)	Actuator, Sng-gng	S-SG-3-WR	630	WIK
(1)	Lot: Control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress and ingress. Pressing either actuator signals operator to open RHR door leaf. Door closes after time delay.

Hardware Set E01

Non-electrified Items:

(1)	Continuous Hinge	SL11HD	628	SEL
(1)	Offset Pull	7191-14 x N-MD Mtg	630	TRI
(1)	NS Panic Device, Rim, 03	LD33A-NL-OP	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8” door undercut required for proper mating of door bottom with seal integral to threshold.

Note 2: Jamb seals by aluminum door supplier.

Electrified Items:

(1)	Rim Panic Electric Strike	4850	630	TRN
(1)	PIR Motion Sensor	MD31D-B	Black	SDC
	Note: Locate centered on top jamb.			
(1)	Door Contact, ¾”, Pop-in, DPDT 195-12		White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E02

Non-electrified Items:

(1)	Continuous Hinge	SL11HD	628	SEL
(1)	NS Panic Device, Rim, 01, LD	LD33A-EO	630	VON
(1)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Note 2: Jamb seals by aluminum door supplier.

Electrified Items:

(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. No ingress. Door is monitored for request to exit and door position.

Hardware Set E03

Non-electrified Items:

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E03A

Non-electrified Items:

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Cat H Jamb Seal Set	135NA	628	NGP

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor	MD31D-B	Black	SDC
	Note: Locate centered on top jamb.			
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E03B

Non-electrified Items:

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Storeroom Lock, ¾" Latch	ALX80 x 3/4"	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN

Electrified Items:

(1)	Jamb-to-Door Power Transfer	EPT-10	SP28	VON
(1)	Electric Strike	4100	630	TRN
(2)	Pushbutton Station	5236 x P25 x T24 x L	628	DTR

Note: Under-the-desk-mount Pushbutton Station has (1) DPDT momentary pushbutton, (1) DPDT maintained (1)

	PIR Motion Sensor	MD31D-B	Black	SDC
	Note: Locate centered on top jamb.			
(2)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key, card, or pushbutton located at Reception 104 and Reception 120. Doors are monitored for request to exit and door position.

Hardware Set E03C

Non-electrified Items:

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Extended Wall Stop	1298	626	TRI

Note: Locate on wall approx. 6" down and in from top lock corner of door as far out from hinge as possible.

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor	MD31D-B	Black	SDC

Note: Locate centered on top jamb.

(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E03D

Non-electrified Items:

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor	MD31D-B	Black	SDC

Note: Locate centered on top jamb.

(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E03E

Non-electrified Items:

(1)	Continuous Hinge	SL24HD	628	SEL
(1)	Storeroom Lock	ND80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Spring Stop	4040XP SCUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Lock Guard, Electric Strike		626	DonJo
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E03F

Non-electrified Items:

(2)	Continuous Hinge	SL24HD	628	SEL
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Storeroom Lock, ¾" Latch	ND80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop	4040XP SCUSH	689	LCN
(2)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Lock Guard, Electric Strike		626	DonJo
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Note 2: Overlapping welded steel astragal on push side of inactive leaf by door supplier.

Electrified Items:

(1)	Jamb-to-Door Power Transfer	EPT-10	SP28	VON
(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(2)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Doors are monitored for request to exit and door position.

Hardware Set E03G

Non-electrified Items:

(1)	Continuous Hinge	SL24HD	628	SEL
(1)	Storeroom Lock	ND80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Lock Guard, In-swinging	ILP 212 - CP	652	DJO
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Cat H Jamb Seal Set	135NA	628	NGP
(1)	Door Bottom Shoe/Drip	216APK		PEM
(1)	¼" Saddle Threshold	513 x RCE	628	NGP

Note 1: ¾" door undercut required for proper mating of door shoe with threshold. Mount threshold, then door shoe, then kick plate butted to door shoe. Notch door shoe as required for tight fit-up.

Electrified Items:

(1)	Electric Strike	4100	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E04

Non-electrified Items:

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Fire Exit Device, Rim, 03	99L-NL-F x 996NL	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP

Electrified Items:

(1)	Electric Strike	4800F	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E05

Non-electrified Items:

(2)	Continuous Hinge	SL24HD	628	SEL
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Storeroom Lock, ¾" Latch	ND80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop/HO	4040XP SHCUSH	689	LCN
(2)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Lock Guard, Cylindrical Lock	1082-6S	630	TRI
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Note 2: Overlapping welded steel astragal on push side of inactive leaf by door supplier.

Electrified Items:

(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(2)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI
(1)	Lot: Control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Free egress. Ingress by key. Doors are monitored for request to exit and door position.

Hardware Set E06

Non-electrified Items:

(1)	Continuous Hinge	SL24HD	628	SEL
(1)	Panic Device, Rim, 03, LD	LD99NL x 697NL	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Spring Stop	4040XP SCUSH	689	LCN
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Electrified Items:

(1)	Rim Panic Electric Strike	4850	630	TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Door is monitored for request to exit and door position.

Hardware Set E06A

Non-electrified Items:

(2)	Continuous Hinge	SL24HD	628	SEL
(1)	Key Removable Mullion	KR-4954 x 154	689	VON
(1)	Panic Device, Rim, 01, LD	LD99EO	630	VON
(1)	Panic Device, Rim, 03, LD	LD99NL x 697NL	630	VON
(2)	Rim Cylinder	SFIC 6-pin	626	SCH
(2)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop/HO	4040XP SHCUSH	689	LCN
(2)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Cat H Adhesive Mullion Seal/Mute	MS-SA/75	BRN	DHS
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8” door undercut required for proper mating of door bottom with seal integral to threshold.

Electrified Items:

(1)	Rim Panic Electric Strike	4850	630	TRN
(1)	Mullion Wire Harness Note: Drill mullion headcap and top jamb for pass through of wires and harness for easy wire disconnect	MWH-5		TRN
(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(2)	Door Contact, ¾”, Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key or card. Doors are monitored for request to exit and door position.

Hardware Set E07

Non-electrified Items:

(2)	Continuous Hinge	SL24HD	628	SEL
(1)	Panic Device, CVR, 01	LD9947EO	630	VON
(1)	Panic Device, CVR, 03	LD9947NL x 697NL	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop/HO	4040XP SHCUSH	689	LCN
(2)	Kick Plate	KO050 8 x 1LDW x CS x B4E	630	TRI
(1)	Overhead Rain Drip	16A	628	NGP
(2)	Astragal Seal Set	172NA	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Electrified Items:

(1)	PIR Motion Sensor Note: Locate centered on top jamb.	MD31D-B	Black	SDC
(2)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Card reader, control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key. Door is monitored for request to exit and door position.

Hardware Set E08

Non-electrified Items:

(1)	Continuous Hinge	SL24HD	628	SEL
(1)	Classroom/Double Cyl Deadbolt	314-1/4ST x Less Cylinders	626	YAL
(2)	Mortise Cylinder	SFIC 6-pin	626	SCH
(2)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Push Plate	1809-4 x RC x CFC x CFT	630	TRI
(1)	Pull Plate	1014-3B x RC x CFC	630	TRI
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 1LDW x CS x B4E	630	TRI
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Electrified Items:

(1)	Door Contact, ¾", Pop-in, DPDT	195-12	White	GRI

(1) Lot: Control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.

System Function:

Free egress. Ingress by key. Door is monitored for door position.

Hardware Set E09

Non-electrified Items:

All hardware by door supplier.

Electrified Items:

(1)	Door Contact, Surface, TB, DPDT GR2707-AD		628	GRI
(1)	Lot: Control electronics, low voltage power, low voltage cabling and terminations, and programming: see Electrical Specifications.			

System Function:

Door is monitored for door position.

Hardware Set 01

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Office Lock	ALX53	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 01A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Office Lock	ALX53	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Overhead Stop, HD, Concealed	100S x ADJ	630	GLY

Hardware Set 01B

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Office Lock	ALX53	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS

Hardware Set 01C

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Office Lock	ALX53	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS

Hardware Set 02

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS

Hardware Set 02A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 02B

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Classroom Lock, ¾" Latch	ALX70 x 3/4"	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN

Note 1: Jamb seals and meeting edge seals by aluminum door supplier.

Hardware Set 02C

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Extended Wall Stop	1298	626	TRI
	Note: Locate on wall approx. 6" down and in from top lock corner of door as far out from hinge as possible.			
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS
(1)	Closer Mounting Bracket	7ASL	689	NGP

Note 1: Do not cut top jamb sound seal for closer arm bracket. Lower the closer on the door and mount closer arm bracket to 7ASL closer mounting bracket.

Hardware Set 02D

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 02E

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Classroom Lock, ¾" Latch	ALX70 x 3/4"	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Armor Plate	KA050-2 34 x 1LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Extended Wall Stop	1298	626	TRI

Note: Locate on wall approx. 6" down and in from top lock corner of door as far out from hinge as possible.

Hardware Set 02F

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Overhead Stop, HD, Concealed	100S x ADJ	630	GLY

Hardware Set 02G

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN

Note: Provide special templating so as not to conflict with overhead stop.

(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Mop Plate	KM050 4 x 1LDW x CS x B4E	630	TRI
(1)	Overhead Stop, HD, Concealed	100S x ADJ	630	GLY
(1)	Cat H Jamb Seal Set	135NA	628	NGP

Hardware Set 02H

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Classroom Lock	ALX70	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP

Hardware Set 02J

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Classroom Lock, ¾" Latch	ALX70 x 3/4"	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Stop/HO	4040XP HCUSH	689	LCN

(2)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(2)	Astragal Seal Set	172NA	628	NGP
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(2)	Surface Sound Sweep	SSDB3	628	DHS
(1)	Closer Mounting Bracket	7ASL	689	NGP

Note 1: Do not cut top jamb sound seal for closer arm bracket. Lower the closer on the door and mount closer arm bracket to 7ASL closer mounting bracket.

Hardware Set 02K

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Manual Flush Bolt	3917-12	626	TRI
(1)	Manual Flush Bolt	3917-24 (top)	626	TRI
(1)	Classroom Lock, ¾" Latch	ALX70 x 3/4"	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Overhead Stop, HD, Surface	900S	630	GLY

Hardware Set 02L

(1)	Continuous Hinge	SL24HD	628	SEL
(1)	Storeroom Lock	ND80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Spring Stop	4040XP SCUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Lock Guard, Cylindrical Lock	1082-6S	630	TRI
(1)	Overhead Rain Drip	16A	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(1)	Panic Threshold	896N x RCE	628	NGP

Note 1: 3/8" door undercut required for proper mating of door bottom with seal integral to threshold.

Hardware Set 03

(3)	Butt Hinges	BB1191 4.5 x 4.0	630	HAG
(1)	Privacy Set w/Indicator	ND40 RHO x OS-OCC	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Mop Plate	KM050 4 x 1LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 03A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Privacy Set w/Indicator	ND40 RHO x OS-OCC	626	SCH
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI

Hardware Set 03B

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Privacy Set w/Indicator	ND40 RHO x OS-OCC	626	SCH
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 03C

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Privacy Set w/Indicator	ND40 RHO x OS-OCC	626	SCH
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS

Hardware Set 03D

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Privacy Set w/Indicator	ND40 RHO x OS-OCC	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Mop Plate	KM050 4 x 1LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 04

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Kick Plate	KO050 16 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 04A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Storeroom Lock	ALX80	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 16 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Surface Sound Sweep	SSDB3	628	DHS

Hardware Set 05

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Push Plate	1809-4 x RC	630	TRI
(1)	Pull Plate	1014-3B x RC	630	TRI
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI

Hardware Set 05A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Push Plate	1809-4 x RC	630	TRI
(1)	Pull Plate	1014-3B x RC	630	TRI
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 05B

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Push Plate	1809-4 x RC	630	TRI
(1)	Pull Plate	1014-3B x RC	630	TRI
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
	Note: Provide special templating so as not to conflict with overhead stop.			
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Overhead Stop, HD, Concealed	100S x ADJ	630	GLY

Hardware Set 05C

(6)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(2)	Push Plate	1809-4 x RC	630	TRI
(2)	Pull Plate	1014-3B x RC	630	TRI
(2)	Closer, w/Stop	4040XP CUSH	689	LCN
(2)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI

Hardware Set 06

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Offset Pull	7191-14 x N-MD Mtg	630	TRI
(1)	Dummy Panic Bar	330	630	VON
(1)	Closer, HD Parallel Arm	4040XP EDA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 06A

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Offset Pull	7191-14 x N-MD Mtg	630	TRI
(1)	Dummy Panic Bar	330	630	VON
(1)	Closer, w/Spring Stop	4040XP SCUSH x 4040-30 x 4040-61	689	LCN

Hardware Set 07

(3)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(1)	Panic Device, Rim, 03, LD	LD99NL x 697NL	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 08

(3)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(1)	Panic Device, Rim, 08	LD99L x 996L	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, Parallel Arm	4040XP Reg/PA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(1)	Surface Sound Sweep	SSDB3	628	DHS
(1)	Closer Mounting Bracket	7ASL	689	NGP

Note 1: Do not cut top jamb sound seal for closer arm bracket. Lower the closer on the door and mount closer arm bracket to 7ASL closer mounting bracket.

Hardware Set 08A

(3)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(1)	Panic Device, Rim, 08	LD99L x 996L	630	VON
(1)	Rim Cylinder	SFIC 6-pin	626	SCH
(1)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(1)	Closer, HD Parallel Arm	4040XP EDA	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI

Hardware Set 09

(6)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(2)	Panic Device, SVR, 08	LD9927L x 996L	630	VON
(2)	Rim Cylinder	SFIC 6-pin	626	SCH
(2)	Permanent Cylinder Core	SFIC 6-pin	626	SCH
(2)	Closer, w/Stop	4040XP CUSH	689	LCN
(2)	Kick Plate	KO050 8 x 1LDW x CS x B4E	630	TRI
(2)	Astragal Seal Set	172NA	628	NGP
(1)	Adjustable Jamb Seal Set	107NA	628	NGP
(2)	Surface Sound Sweep	SSDB3	628	DHS
(2)	Closer Mounting Bracket	7ASL	689	NGP

Note 1: Do not cut top jamb sound seal for closer arm bracket. Lower the closer on the door and mount closer arm bracket to 7ASL closer mounting bracket.

Hardware Set 10

(3)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(1)	Fire Exit Device, Rim, 14	LD99L F x 996L	630	VON
(1)	Closer, Regular Arm	4040XP Reg	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI
(1)	Wall Stop, Convex	1270CX	626	TRI
(1)	Cat H Jamb Seal Set	135NA	628	NGP

Hardware Set 11

(3)	Butt Hinges	BB1279 4.5 x 4.0	652	HAG
(1)	Passage Set	ALX10S	626	SCH
(1)	Closer, w/Stop	4040XP CUSH	689	LCN
(1)	Kick Plate	KO050 8 x 2LDW x CS x B4E	630	TRI

Hardware Set 12

All hardware by overhead door supplier.

Hardware Set 13

(6)	Butt Hinges	BB1168 5 X 4.5	652	HAG
(2)	Fire Exit Device, CVR, 14	9947EO-F x LBR x 996L	630	VON
(2)	Closer, HD Parallel Arm	4040XP EDA	689	LCN
(2)	Kick Plate	KO050 8 x 1LDW x CS x B4E	630	TRI
(2)	Wall Stop, Convex	1270CX	626	TRI
(2)	Astragal Seal Set	172NA	628	NGP
(1)	Cat H Jamb Seal Set Note: Apply to side jambs.	135NA	628	NGP
(1)	Cat H Adhesive Jamb Seal Set Note: Apply to top jamb.	2525C	Brown	NGP
(2)	Surface Sound Sweep	SSDB3	628	DHS

END OF SECTION 087100

SECTION 088000

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior and interior glazing for doors, windows, storefronts, and curtainwalls.
      a. Vision Glass IGU (GL-1).
      b. Hardened Space Vision Glass IGU (GL-2).
      c. Spandrel Glass IGU (GL-3).

B. Principal Products:
   1. Clear glass.
   2. Heat treated glass.
   3. Spandrel glass.
   4. Insulating glass.
   5. Laminated glass.
   6. Bird safe glass.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate Work results of this Section with doors and frames provided by others.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Each type of glass.
   2. Initial selection color charts:
      a. Butt glazing sealant.
      b. Interlayer for laminated glass.
      c. Colors for silk screened patterns.

B. Samples: 12 by 12 inch Samples of each glass type except clear monolithic.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Independent testing agency test results showing:
   1. Fire performance.

B. Impact resistance data and approval notice.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For insulating glass.

1.6 QUALITY ASSURANCE

A. Mockups: Provide glass for fenestration in exterior wall mockups.

1.7 FIELD CONDITIONS

A. Ambient Conditions:
   1. Temperature: Minimum 40 degrees F and rising.
   2. Install glass only when glazing frames are free of moisture, including condensation, frost, and ice.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Coated Glass: Warrant against peeling, cracking, or other coating deterioration.
      a. Warranty Period: Ten years.
   2. Laminated Glass: Warrant against edge separation, delamination, or other defects.
      a. Warranty Period: Ten years.
   3. Insulating Glass: Warrant against the following:
      a. Edge seal failure.
      b. Internal condensation that does not dissipate.
      c. Spacer delamination.
      d. Warranty Period: Ten years.

PART 2 PRODUCTS

2.1 BASE GLASS

A. Annealed Float Glass: ASTM C1036, Type I, Class 1, Quality-Q3.

2.2 HEAT TREATED GLASS

A. Heat Strengthened Float Glass: ASTM C1048, Type 1, Quality Q3; free of mosaic or pattern distortion visible from fixed viewpoint and other defects caused by roller pick.
   1. Heat-Strengthened Glass: Kind HS.
   2. Tempered Glass: Kind FT.

B. Roll Ripple Surface Wave Tolerances:
   1. Heat-Strengthened Glass: 0.002 inch, maximum.
   2. Tempered Glass: 0.005 inch, maximum.

C. Roll Ripple Orientation: Horizontal.

D. Fabricate heat treated units with permanent label in consistent location at either lower corner.

2.3 COATED GLASS

A. Vacuum Deposition Coated Glass: ASTM C1376.
   1. Manufacturers and Products:
      a. Guardian Glass SunGuard SN54, as Basis-of-Design.
      b. Vitro Architectural Glass Solarban 70, typical.
   2. Color and Performance Attributes: See glass types on Drawings.
   3. Insulating Glass: Delete or omit coating from glass edges where spacer sealant is applied.

B. Spandrel Glass: Ceramic coating; tested per GANA publication 89-1-6.
   1. Coating Manufacturers and Products.
      a. ICD High Performance Coatings Opaci-Coat-300.
   2. Coating Thickness: 8 mil, minimum.
   3. Color: Architect selected.
   4. Insulating Glass Application: 4 surface.

2.4 INSULATING GLASS

A. Insulating Glass Units: Factory assembled double pane units tested per ASTM E2190.

B. Warm Edge Spacer Strips: Rigid plastic with desiccant fill.
   1. Manufacturers and Products:
      a. Quanex Building Products Duraseal.
      b. Technoform TGI-Spacer M.
      c. Viracon VTS.
      d. Vitro Intercept.
   2. Color: Black.

C. Space Fill: Dehydrated air.

D. Edge Seals:
   1. Primary Seal: Black polyisobutylene.
   2. Secondary Seal: Silicone.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172, two glass plies permanently bonded with interlayer.
   1. Glass Plies: Heat-Strengthened glass.
   2. Glass Ply Thickness: 11.3 mm (15/32") mm.
   3. Interlayer Type: ionomeric polymer cast in place cured resin with polyethylene terephthalate film reinforcement.
      a. Basis-of-Design: Kuraray; SentryGlas ionoplast sheet.
   4. Interlayer Thickness:
      a. Windborne Debris Impact Resistance: 0.090 inch ionomeric polymer for large missile conditions.
   5. Interlayer Appearance: Clear.

2.6 BIRD SAFE GLASS

A. Bird Safe Glass Units: Factory assembled insulating glass units with bird deterrent frit pattern.
   1. Manufacturers and Products:
      a. Walker Glass Company AviProtek.
      b. Arnold Glas ORNILUX.
      c. Guardian Glass Bird 1st Etch.
   2. Frit Pattern: Architect Selected.
   3. Source Control: Provide fabricated glass with bird deterrent etching from same manufacturer and fabricator as IGUs.
   4. Configuration: See glass types.

2.7 GLASS TYPES

A. See Drawings and FFE specifications.

B. Glass Type GL-01: Vision Glass IGU.
   1. Coated Glass Manufacturers and Products:
      a. Guardian Glass SunGuard SNX 60, as basis of design.
      b. Vitro Architectural Glass Solarban 70.
   2. Outer Lite: 6 mm heat-strengthened clear glass.
      a. Vacuum Deposition Coating: Low-E, #2 surface.
   3. Space Fill: 1/2" (90% Argon / 10% Dehydrated air fill).
   4. Inner Lite: 6 mm heat-strengthened clear glass.
   5. All lites to be tempered safety glazing.
   6. Thermal Performance:
      a. Winter U-Factor (Btu/h ft.² F): 0.24, max.
      b. Winter U-Factor (W/m² K): 1.36, max.
      c. Solar Heat Gain Coefficient: 0.24.

d. Shading Coefficient: 0.28.
e. Light to Solar Gain: 2.46.

7. Optical Performance:
   a. Visible Light Transmittance: 60% min.
   b. Visible Light Reflectance (outside): 14% min.
   c. Visible Light Reflectance (inside): 15% min.
   d. Total Solar Transmittance: 22%.
   e. Total Solar Reflectance (outside): 45%.
   f. Ultraviolet Transmittance: 8%.

C. Glass Type GL-02: Hardened Space Vision Glass IGU.
   1. Coated Glass Manufacturers and Products:
      a. Guardian Glass SunGuard SNX 60, as Basis-of-Design.
      b. Vitro Architectural Glass Solarban 70, as basis of design.
   2. Outer Lite: 6 mm heat-strengthened clear glass.
      a. Vacuum Deposition Coating: Low-E, #2 surface.
   3. Space Fill: 1/2" (90% Argon / 10% Dehydrated air fill).
   4. Inner Lite: Laminated.
      a. Glass Plies: 11.3 mm (15/32") heat-strengthened clear glass.
      b. Interlayer Thickness: 0.090 inch ionomeric polymer for large missile conditions.
   5. Thermal Performance:
      a. Winter U-Factor (Btu/h ft.² F): 0.23, max.
      b. Winter U-Factor (W/m² K): 1.33, max.
      c. Solar Heat Gain Coefficient: 0.24.
      d. Shading Coefficient: 0.28.
      e. Light to Solar Gain: 2.38.
   6. Optical Performance:
      a. Visible Light Transmittance: 57% min.
      b. Visible Light Reflectance (outside): 14% min.
      c. Visible Light Reflectance (inside): 14% min.
      d. Total Solar Transmittance: 20%.
      e. Total Solar Reflectance (outside): 45%.
      f. Ultraviolet Transmittance: <1%.

D. Glass Type GL-03: Spandrel Glass IGU.
   1. Coated Glass Manufacturers and Products:
      a. Guardian Glass SunGuard SN 54, as Basis of Design.
      b. Vitro Architectural Glass Solarban 70.
   2. Outer Lite: 6 mm heat-strengthened clear glass.
      a. Vacuum Deposition Coating: Low-E, #2 surface.
   3. Space Fill: 1/2" (90% Argon / 10% Dehydrated air fill).
   4. Inner Lite: 6 mm heat-strengthened clear glass.
      a. Ceramic Coating: OPACI-COAT-300, #4 surface.
      b. Color: Black.
   5. All lites to be tempered safety glazing.
   6. Thermal Performance:
      a. Winter U-Factor (Btu/h ft.² F): 0.24, max.
      b. Winter U-Factor (W/m² K): 1.37, max.

c. Solar Heat Gain Coefficient: N/A.
d. Shading Coefficient: N/A.
e. Light to Solar Gain: N/A.

7. Optical Performance:
   a. Visible Light Transmittance: N/A.
   b. Visible Light Reflectance (outside): N/A.
   c. Visible Light Reflectance (inside): N/A.
   d. Total Solar Transmittance: N/A.
   e. Total Solar Reflectance (outside): N/A.
   f. Ultraviolet Transmittance: N/A.

2.8 INSTALLATION MATERIALS

A. Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 80 to 90 Shore A durometer hardness.

B. Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 50 to 60 Shore A durometer hardness.

C. Glazing Gaskets: Specified with framing system.

D. Interior Glazing Tape: ASTM C1281 and AAMA 800; butyl based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, coiled on release paper; widths required for installation.
   1. Color: Black.
   2. Supply preshimmed tape with continuous spacer for hollow metal glazing frames and other applications recommended by tape manufacturer.

E. Smoke Removal Targets: As required by local fire marshal.

2.9 PERFORMANCE

A. Structural Loads: Design and size components of curtain wall assembly to withstand loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with SEI/ASCE 7-22 to establish wind pressured based on the following criteria:
   1. Wind Loads: Florida Wind Debris Region.
   2. Ultimate Design Wind Speed (Vult): 154 mph.
   3. Nominal Design Wind Speed (Vasd): As indicated on Drawings.
   4. Occupancy Risk Category: II.
   5. Exposure Category: C.
   6. Internal Pressure Coefficient (GCPE): Plus/minus 0.18.
   7. Other Design Loads: As indicated on Drawings.
   8. Enclosure Classification:
      a. Enclosed for Buildings: Administration and Transfer Building.
      b. Partially Enclosed: Buildings: Maintenance and Bus Wash.

B. Wind-Borne Debris Resistance: ASTM E1996, tested per ASTM E1886.
   1. Missile impact and cyclic-pressure for Wind Zone 4.
   2. Florida Outside High Velocity Hurricane Zone product approval.

C. Impact:
   1. Safety Glazing: 16 CFR 1201, Category II.

D. Acoustic Performance:
   1. OITC: 37, minimum.
   2. STC: 45, minimum.

2.10 FABRICATION

A. Fabricate before delivering glass to site.

B. Provide code required permanent labels in locations that will be visible but inconspicuous after installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Framing is ready to receive glazing.
   2. Weep systems are unblocked and functional.
   3. Face and edge clearances are sufficient.
   4. Framing joints are properly sealed.

B. Examine glass lites for damage and defects before installation.

C. Do not install tempered glass with noticeable roller pick optical distortion.

3.2 PREPARATION

A. Clean glazing channels and rabbets; remove loose materials and moisture.

B. Remove protective coatings on metal surfaces.

C. Clean glass just before installation.

3.3 INSTALLATION - GENERAL

A. Install glass without direct contact on framing surfaces.

B. Maintain manufacturer recommended edge and face clearances between glass and frame members.

C. Set glass centered in openings on setting blocks.

D. Provide edge blocking needed to prevent sideways movement of glass in framing.

E. Set glass with correct orientation of exterior side.

3.4 INSTALLATION - GASKET GLAZING

A. Fabricate gaskets to fit openings.

B. Install gaskets in single pieces on each side of opening with joints only at corners.

C. Where recommended by framing system manufacturer, seal corners watertight.

D. Compress gaskets to produce weathertight seal without causing bending stresses in glass.

3.5 INSTALLATION - TAPE GLAZING

A. Install tape on fixed stop form continuous airtight seals. Do not stretch tapes to make them fit.

B. Butt tape corners with full contact.

C. Install tape projecting slightly above sight line.

D. Insert spacer shims between glass and applied stops at 24 inch intervals, but not less than 2 per side, and 1/4 inch below sight line.

E. Install removable glazing stops in full contact with tape.

F. Trim protruding tape edges flush with stops.

3.6 CLEANING

A. Remove nonpermanent labels and clean surfaces after installation.

B. Clean glass on both sides shortly before inspection for Substantial Completion.

3.7 PROTECTION

A. Protect glass vulnerable to damage with streamers attached to framing.

B. Exterior Glass:
   1. Protect glass from contact with contaminating substances.

2. Examine glass surfaces below concrete or masonry for alkaline deposits and dirt, and remove such soiling when observed.
3. Provide new replacement units for damaged glass, including glass with stains or etching that cannot be removed.

END OF SECTION

SECTION 088300

MIRRORS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Commercial grade wall-mounted mirrors.

B. Principal Products:
1. Mirrors.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate installation of mirrors with wood panel substrates.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Mirror glass.
2. Installation accessories.

B. Shop Drawings:
1. Each custom mirror type and size.
2. Mirror wall panels; show joint locations.

C. Samples:
1. Mirrors: 12 inches square.
a. Demonstrate edge treatment.

1.4 QUALITY ASSURANCE

A. Glazing Publications: Comply with GANA's "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

1.5 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Installation Temperature: 50 degrees F, minimum.

1.6 WARRANTY

A. Manufacturer Warranty:
   1. Warrant against silver spoilage.
   2. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 MIRRORS

A. Back-Coated Safety Mirrors: ASTM C1036, Type 1 transparent flat, Class 1-Clear, Quality-Q1; with copper and silver coating, organic overcoating, and special back coating or film per CPSC 16 CFR 1201 Category II safety glazing standard.
   1. Edges: See Drawings.
   2. Thickness: 6 mm.

2.2 INSTALLATION MATERIALS

A. Setting Blocks: Silicone; 80 to 90 Shore A durometer hardness.

B. Top and Bottom Channels: Extruded aluminum J-profile channels, supplied with stainless steel screws.
   1. Finish: Architect selected.

C. Mirror Mastic: Adhesive setting compound manufactured specifically for mounting mirrors, compatible with mirror backing materials and substrate.

D. Edge Sealer: Approved by mirror manufacturer.

E. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

2.3 PERFORMANCE

A. Safety Mirrors: 16 CFR 1201, Category II.

2.4 FABRICATION

A. Fabricate mirrors and mounting channels to size before delivery to site.

B. Fabricate mirrors for 1/8 inch clearance to adjacent construction.

C. Seal edges to prevent chemical or atmospheric penetration of reflective coating.

D. Film-Backed Safety Mirrors: After cutting to size, apply film backing to produce smooth surface without bubbles, wrinkles, or other imperfections.

E. Mirror Edge Treatment: Flat polished. Seal edges of mirrors with edge sealer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall surfaces are in plane so mirrors can be installed without distortion.

3.2 PREPARATION

A. Adhesive Installation: Clean surfaces, remove adhesion-inhibiting substances.

3.3 INSTALLATION

A. Follow GANA Glazing Manual for mirror installation methods.

B. Install mirrors plumb and level, and free of optical distortion.

C. Install mirrors with 1/8 inch edge clearance and 1/8 inch, minimum space behind mirror.

D. Adhesive Installation:
   1. Screw bottom channels to wall framing.
   2. Install setting blocks in thin bead of silicone sealant.
   3. Apply adhesive mastic.
   4. Set mirrors so that adhesive mastic forms uniform anchorage thickness.
   5. Hold mirrors in place until adhesive sets.

3.4 CLEANING

A. Remove labels, wash and polish mirror surfaces and metal supports.

END OF SECTION

SECTION 090561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Test concrete floor slabs for moisture and alkalinity.
   2. Prepare new concrete slabs for the following flooring types:
      a. Resilient tile and sheet.
      b. Broadloom or tile carpet.
      c. Wood flooring.
   3. Remediate concrete floor slabs due to unsatisfactory moisture or alkalinity conditions.

B. Principal Products:
   1. Testing apparatus.
   2. Patching and self-leveling compounds.
   3. Remedial floor coatings.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate work results of this section with manufacturer recommendations for specified finish flooring types.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Floor Covering and Adhesive Manufacturer Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
      a. Moisture and alkalinity limits and test methods.
      b. Manufacturer required bond/compatibility test procedure.
   2. Remedial Materials:
      a. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.

1.4 INFORMATIONAL SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Testing Agency Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.
   6. Include certification of accuracy by authorized official of testing agency.
   7. Submit report to Architect and Owner two Business Days, maximum after conclusion of testing.

C. Adhesive Bond and Compatibility Test Report.

D. Specimen Warranty: Issued by remedial material manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For remedial floor coatings.

1.6 QUALITY ASSURANCE

A. Testing Agency: Employ and pay for an independent testing agency to perform moisture and alkalinity testing.
   1. Qualifications: Experienced in specified testing methods.
   2. Contractor Responsibility Relating to Independent Agency Testing:
      a. Provide access for and cooperate with testing agency.
      b. Confirm date of start of testing at least 10 days before actual start.
      c. Allow at least 4 Business Days on site for testing agency activities.
      d. Achieve and maintain specified ambient conditions.
      e. Notify Owner when specified ambient conditions have been achieved and when testing will start.

B. Mockup: Construct and test mockup per ASTM F3010.

C. Remedial Coating Installer Qualifications: Flooring preparation specialist company, trained or employed by coating manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer packaging; include installation instructions.

B. Keep materials from freezing.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours before testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours before testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.1 FLOORING PREPARATION MATERIALS

A. Patching and Self-Leveling Compound:
   1. Cementitious moisture, mildew, and alkali resistant compound, compatible with floor, floor covering, and floor covering adhesive, capable of being installed to thicknesses shown, and feathered to nothing at edges.
   2. Compressive Strength: 4000 psi, minimum after 28 days per ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Flooring Adhesive: Floor covering or adhesive manufacturer recommended product, suitable for the moisture and pH conditions present.
   1. VOC Content: 50 g/L, maximum.

C. Remedial Floor Coating: Single or multilayer coating or coating/overlay combination.
   1. Manufacturers and Products: Testing agency recommended or one of the following:
      a. ARDEX Engineered Cements ARDEX VB 100 with ARDEX V 1200.
      b. Custom Building Products CustomTech Tech MVC with TechLevel 100.
      c. Dependable Floor Products; Platform EMS with SKIMFLOW LP.
      d. KOSTER American Corporation KOSTER VAP I 2000 FS with KOSTER LevelStrong.
      e. LATICRETE International, Inc. Vapor Ban with NXT Level.
      f. MAPEI Planiseal VS with Ultraplan Easy.
      g. UZIN; UZIN PE 460 with UZIN NC 157.
   2. Primer: Manufacturer recommended for selected assembly.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Follow ASTM F3010.

3.2 CONCRETE SLAB PREPARATION - NORMAL WEIGHT CONCRETE

A. Follow recommendations of testing agency and ASTM F3010.

B. Perform following operations in this order:
   1. Perform preliminary cleaning.
   2. Internal Relative Humidity Testing: Three tests in the first 1000 square feet and one test in each additional 1000 square feet, or flooring manufacturer recommended frequency.
   3. Alkalinity Tests: Relative humidity test locations.
   4. Specified remediation, if required due to relative humidity test result.
   5. Patching, smoothing, and leveling.
   6. Other preparation specified in finish flooring sections.
   7. Adhesive bond and compatibility test.
   8. Apply protection.

C. Remediations:
   1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct before doing any other remediation; retest after correction.
   2. Excessive Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
   3. Excessive Alkalinity:
      a. If remedial floor coating is necessary to address excessive moisture, no additional remediation is required for pH.
      b. If an adhesive that is resistant to the pH level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.3 PRELIMINARY CLEANING

A. Clean floors, remove adhesion inhibiting substances.

B. Do not use solvents for cleaning.

3.4 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer requirements conflict with either the referenced test method or this Specification, follow the manufacturer requirements.

B. Testing: ASTM F2170 Procedure A. Calcium Chloride and electrical impedance or resistance testing may not be substituted.

C. If test values exceed floor covering manufacturer limits, perform remediation. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

D. Report the information required by the test method.

3.5 ALKALINITY TESTING

A. Where the floor covering manufacturer requirements conflict with either the referenced test method or this Specification, follow the manufacturer requirements.

B. Use a wide range alkalinity test paper, its associated chart, and distilled or deionized water.

C. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity test paper into the water, remove it, and compare immediately to chart to determine alkalinity reading.

D. In the event that test values exceed floor covering manufacturer limits, perform remediation. In the absence of manufacturer limits, perform remediation if alkalinity test value exceeds 10.

3.6 PREPARATION

A. See individual floor covering sections for additional requirements.

B. Follow testing agency recommendations.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other nonmoving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.7 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Follow requirements and recommendations of floor covering manufacturer.

3.8 APPLICATION OF REMEDIAL FLOOR COATING

A. Mix and apply remedial floor coating.
   1. Prohibit traffic during application.
   2. Honor substrate control, isolation and expansion joints.
   3. Prime substrate, and apply floor coating in layers as recommended by manufacturer.
   4. Allow coating to cure before applying finish flooring.

3.9 PROTECTION

A. Cover prepared floors with building paper or other durable covering until finish flooring is installed.

END OF SECTION

SECTION 090561.13

MOISTURE VAPOR EMISSION CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Moisture-vapor-emission (MVE) membrane-forming system to control high moisture levels of concrete subfloors prior to installation of interior stone floor tile.

B. Section Includes:
1. MVE-control system - fluid applied that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.
2. MVE-control system - sheet membranes that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.
3. Contractor to perform testing of the floor before installing any materials to the subfloors. Contractor to review test results with each finish flooring manufacturer for manufacturer's additional recommendations.

C. Related Sections:
1. Section 033000 “Cast-in-Place Concrete.”.
2. Section 035416 “Hydraulic Cement Underlayment” for patching, repairing, leveling of concrete subflooring.
3. Division 09 finished flooring specification sections for scheduled floor finishes and subfloor preparation requirements.

1.2 DEFINITIONS

A. MVE: Moisture vapor emission per ASTM F710, a term used by the flooring industry in the United States to measure moisture emission from concrete floors in pounds per 1000 sq. ft. during a 24-hour period (56.51 µg/(s m2)) using the anhydrous calcium chloride test.

B. MVER: Moisture vapor emission rate per ASTM F1869, a term used to indicate the amount of water vapor in pounds emitted from a 1000 sq. ft. area of concrete flooring during a 24-hour period.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each MVE-control system, for tests performed by a qualified testing agency.

B. Preinstallation testing reports.

C. Field quality control reports.

D. Qualification Statements: For Installer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.

B. Installer Qualifications: Entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sunlight. Product shall not be stored in areas with temperatures in excess of 90°F or below 50°F unless permitted by manufacturer’s instructions.

C. Handle products using methods that prevent breakage or damage of containers and prevent contamination of products.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
   1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F (18 deg C) and not more than 85 deg F (29.4 deg C) at least 48 hours before use.
   2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than

65 deg F (18 deg C) or more than 85 deg F (29.4 deg C) and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F (3 deg C) higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
4. Protect moisture vapor control system after installation to prevent damage from topical moisture, direct sunlight, and construction traffic for a minimum period of 24 hours after application.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace the floor covering materials or floor coatings and the applied moisture vapor emission control system, that fails in materials and or workmanship within specified warranty period.
   1. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
   1. MVER: Maximum 25 lb of water/1000 sq. ft. (11.34 kg of water/92.9 sq. m) when tested in accordance with ASTM F1869.
   2. Relative Humidity: Maximum 90 percent when tested in accordance with ASTM F2170 using in situ probes.

B. Water-Vapor Transmission: Through MVE-control system, maximum 0.10 perm (5.75 ng/Pa x s x sq. m) when tested in accordance with ASTM E96/E96M.

C. Tensile Bond Strength: For MVE-control system, greater than 200 psi (1.38 MPa) with failure in the concrete in accordance with ASTM D7234.

D. Compressive Strength: 12,000 psi minimum according to ASTM D695.

E. Adhesion: Greater than 450 psi according to ASTM D7234.

F. Alkali Resistance: Rated as “resistant” according to ASTM D1308.

G. Microbial Resistance: Passes Rating 1 according to ASTM G21.

H. VOC Content: 0 g/L according to 40 CRF 60, Appendix A7, Method 24.

2.2 MVE-CONTROL SYSTEM - FLUID APPLIED

A. Basis-of-Design Product: Subject to compliance with requirements, provide Dex-O-Tex, VaporControl Primer 1P, or comparable product by one of the following:
   1. ARDEX Americas.
   2. KOSTER American Corporation.
   3. Laticrete International, Inc.

B. MVE-Control System:
   1. ASTM F3010 compliant-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on new and existing concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
      a. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
      b. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.

2.3 ACCESSORIES

A. Patching and Repair Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000 psi (20.68 MPa) compressive strength after 28 days when tested in accordance with ASTM C109/C109M.

B. Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000 psi (20.68 MPa) compressive strength after 28 days when tested in accordance with ASTM C109/C109M.

C. Crack and Joint Repair Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.

D. Substrate Primer: Provide MVE-control system manufacturer's substrate primer if required for system indicated by substrate conditions. Ensure adhesion of products to MVE-control system.

E. Cementitious Underlayment: Hydraulic cement-based underlayment. Provide product as recommended by MVE-control system manufacturer.

F. Seam Tapes: Double-sided tape to adhere to concrete surface and MVE-control sheet membrane surface with seal tape for seams.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of system indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Preinstallation Testing:
   1. Testing Agency: Engage a qualified testing agency to perform tests.
   2. Alkalinity Testing: Perform pH testing in accordance with flooring manufacturer's written instructions or, in the absence thereof, in accordance with ASTM F3441. Install MVE-control system in areas where pH readings are outside the acceptable range of the flooring materials to be installed.
   3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Internal Relative Humidity Test: Using in situ probes, ASTM F2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity levels that exceed flooring manufacturer's published limits.
   4. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. (9.29-sq. m) area of MVE-control system to prepared concrete substrate and test in accordance with ASTM D7234.
      a. Proceed with installation only where tensile bond strength is greater than 200 psi (1.38 MPa) with failure in the concrete.

B. Concrete Substrates: Prepare and clean substrates in accordance with MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
   1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
   2. Provide concrete surface profile CSP as described within ICRI 310.2R as required by the MVE control system, if any, by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
   3. After shot blasting, repair damaged and deteriorated concrete in accordance with MVE-control system manufacturer's written instructions.
   4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
   5. Fill surface depressions and irregularities with patching and repair material.
   6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.

7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.

C. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

3.3 INSTALLATION OF MVE-CONTROL SYSTEM - FLUID APPLIED

A. Confirm that Architect approved mockups.

B. Install MVE-control system - fluid applied in accordance with ASTM F3010 or ASTM F3513 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fisheyes, and voids.
1. Install primers as required to comply with manufacturer's written instructions.

C. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.

D. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.

E. Cure MVE-control system components in accordance with manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.

F. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies in accordance with manufacturer's written instructions.

G. Install cementitious underlayment over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform installation inspections.

B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE-control system is installed without deficiencies.
1. Verify that surface preparation meets requirements.
2. Verify that component coats and complete MVE-control-system film thicknesses comply with manufacturer's written instructions.
3. Verify that MVE-control-system components and installation areas that evidence deficiencies are repaired in accordance with manufacturer's written instructions.

C. MVE-control system will be considered defective if it does not pass inspections.

3.5 PROTECTION

A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.

B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION

SECTION 092116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Gypsum board for exterior wall assemblies.
2. Gypsum board assemblies for interior walls and ceilings.

B. Principal Products:
1. Partition framing.
2. Shaft wall framing.
3. Drywall suspension system (AT3).
4. Gypsum board.
5. Gypsum shaftliner panels.
6. Tile backing panels.
7. Backing plates.
8. Firestopping components.
9. Acoustical framing components.
10. Installation components.

C. Related Requirements.
1. Section 072100 "Thermal Insulation" for acoustic insulation in acoustically rated gypsum board assemblies.
2. Section 0792 00 "Joint Sealants" for requirements for sealing penetrations and outlet boxes in sound-isolating gypsum board assemblies.
3. Section 095113 "Acoustical Panel Ceilings" for drywall-to ACT transition molding.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate concealed framing for supports and anchorage of other work.

B. Preinstallation Meeting:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Shop Drawings:
   1. Shaft wall assemblies.
   2. Grid suspension system.

C. Samples:
   1. Trim Accessories: 12 inch lengths of trim other than edge beads and control joints.
   2. Textured Finishes: Apply to gypsum board, 4 by 6 inches minimum.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Indicating code compliance of stud and track framing members per SFIA product certification program or other approved third party compliance program.

B. Delegated Design Submittals:
   1. Nonstructural metal framing, for deflection limits under horizontal loading. Indicate the following for each partition type and height:
      a. Stud size.
      b. Stud thickness.
      c. Spacing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: ASTM C840.

B. Protect cold-formed framing per AISI S202.

PART 2 PRODUCTS

2.1 FRAMING - GENERAL

A. Framing Members and Components, General: AISI S220.
   1. Protective Coating: ASTM A653, G40 hot dip galvanized.

2.2 PARTITION FRAMING

A. Contractor Option: Use standard steel studs and tracks or high strength embossed steel studs and tracks.

B. Standard Studs and Tracks: AISI S220.
   1. Depth: See Drawings.
   2. Minimum Base Steel Thickness: See Drawings.

C. High Strength Embossed Steel Studs and Tracks:
   1. Manufacturers and Products:

a. ClarkDietrich ProSTUD Framing with Smart Edge technology.
b. Marino\WARE ViperStud.

2. Yield Strength: 50 ksi, minimum; as required by horizontal deflection performance.
3. Depth: See Drawings.
4. Minimum Base Steel Thickness: See Drawings.

D. Deflection Top Track: Provide one of the following:
1. Single Slotted Track: Steel top track with 2 times deflection plus 1 inch deep slotted flanges; studs fastened through slots.
2. Minimum Base Steel Thickness: Match studs.

E. Hat-Shaped Furring Channels:
1. Minimum Base Steel Thickness: See Drawings.
2. Depth: See Drawings.

F. Z-Furring:
1. Minimum Base Steel Thickness: See Drawings.
2. Depth: See Drawings.

G. Bridging: Cold rolled steel channels, with minimum 1/2 inch wide flanges.
1. Depth: See Drawings.

2.3 SHAFT WALL FRAMING

A. Studs: Sheet steel, C-H profiles.
1. Manufacturers and Products:
a. CEMCO CT Studs.
b. ClarkDietrich CT Stud.
c. Marino\WARE CT System.
d. MBA Metal Framing Shaftwall System.
2. Depth: See Drawings.
3. Minimum Base Steel Thickness: As required for performance.

B. Runner Tracks: J-profile, 2 inch long leg, minimum, matching stud depth.
1. Manufacturers and Products:
a. CEMCO J-Runner.
b. ClarkDietrich J-Tabbed Track.
c. Marino\WARE.
2. Minimum Base Steel Thickness: Match steel studs.

C. Firestop Tracks: Accommodate structural deflection while maintaining fire resistance rated assembly continuity.

D. Elevator Hoistway Entrances: Deep J-profile jamb struts, matching stud depth.
1. Manufacturers and Products:
a. CEMCO Deep Leg J-Track.
b. ClarkDietrich J-Tabbed Track.
2. Long Leg Length: 3 inches.

3. Depth: Match studs.
4. Minimum Base Metal Thickness: 33 mil.

2.4 SUSPENSION SYSTEMS

A. Drywall Suspension System - to be used unless otherwise indicated.
   1. Anchorage Devices: Power actuated fasteners, fabricated with loops for attaching wire hangers.
   2. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, diameter thickness per ASTM C754 Section 6.1.1 or 6.1.2.
   3. Rigid Hangers: One of the following types.
      a. Rods: Mild steel, minimum 1/4 inch diameter, hot dip galvanized per ASTM A153.
      b. Flat Hangers: ASTM A653 and ASTM C754; 1-1/2 inch wide steel sheet, 48 mil minimum base steel thickness.
      c. Angles: Formed steel sheet, minimum 7/8 inch legs and 0.040 thickness, G90 hot dip galvanized per ASTM A653.
   4. Cold Rolled Carrying Channels:
      a. Base Steel Thickness: 54 mils, minimum.
      b. Depth: See Drawings.
      c. Flange Width: 1/2 inches, minimum.
   5. Hat-Shaped Furring Channels: AISI S220.
      a. Minimum Base Steel Thickness: See Drawings.
      b. Depth: See Drawings.

B. Drywall Suspension System - AT3, where indicated for walls not extended .to structural deck above.
   1. Pre-engineered for flat ceilings. Heavy duty cold-rolled steel, hot-dipped galvanized finish.
   2. Manufacturers and Products:
      a. United States Gypsum Company (USG); Drywall Suspension System, SC2238, as Basis-of-Design.
      b. Armstrong World Industries Drywall Grid Systems.
      c. Rockfon Chicago Metallic Drywall Grid.
      d. Or approved equal.
   3. System Materials and Components:
      a. Main Tees and Cross Tees:
         1) Double-web, hot-dipped galvanized steel conforming to ASTM C635 heavy-duty classification.
         2) Coating: G40 hot-dipped galvanized (standard interior).
         3) Face: 1-1/2 inch wide, knurled surface to ease screw penetration and eliminate screw spin-out.
         4) Assembly Feature: Reversible locking integral splices on main tees and Quick-Release clips on cross tees.
      b. Perimeter Components:
         1) Drywall Grid Locking Channel (DGLC-12): Knurled-face channel with pre-engineered locking pockets to capture tee ends without perimeter screw-fastening.

c. Direct Deck Attachment Accessories:
   1) Close Mount Attachment Clip (CMAC-1): Galvanized steel direct deck mounting clip designed to anchor main tees straight to the structural deck without hanger wires.

2.5 GYPSUM BOARD

A. Manufacturers:
   1. American Gypsum.
   2. CertainTeed.
   3. Georgia-Pacific.
   4. National Gypsum.
   5. Pabco Gypsum.
   6. USG.

B. Fire Resistant Gypsum Board: ASTM C1396, paper faced.
   1. Core: 5/8 inch, Type X; locations shown on Drawings.

C. Exterior Gypsum Soffit Board: ASTM C1396, with manufacturer standard edges.
   1. Core: 5/8 inch, Type X.

D. Moisture and Mold Resistant Gypsum Board: ASTM C1396.
   1. Manufacturers and Products:
      a. American Gypsum M-BLOC Type X Mold Resistant Gypsum Board.
      b. CertainTeed M2Tech Mold Resistant.
      c. Georgia-Pacific Gypsum ToughRock Mold-Guard.
      d. National Gypsum Gold Bond XP Gypsum Board.
      e. Pabco Gypsum Mold Curb Plus.
      f. USG Sheetrock MoldTough.
   2. Core: 5/8 inch, Type X.
   3. Mold Resistance: 10 per ASTM D3273.

2.6 GYPSUM SHAFTLINER PANELS

A. Gypsum Shaftliner Board, Moisture and Mold Resistant Type X: ASTM C1396.
   1. Manufacturers and Products:
      a. American Gypsum M-BLOCK Shaft Liner Panel.
      b. CertainTeed M2Tech Shaftliner.
      c. Georgia-Pacific ToughRock Shaftliner.
      d. National Gypsum Gold Bond Shaftliner XP.
      e. Pabco Gypsum PABCORE Shaftliner.
      f. USG Sheetrock Mold Tough Gypsum Liner Panel.
   2. Facing: Treated paper.
   3. Thickness: 1 inch.

2.7 TILE BACKING PANELS

A. Glass-Mat, Water Resistant Gypsum Backing Board: ASTM C1178.
   1. Manufacturers and Products:
      a. Georgia-Pacific DensShield Tile Backer, as Basis-of-Design.
      b. CertainTeed GlasRoc Tile Backer.
      c. National Gypsum.
      d. Pabco Gypsum Pabco Glass Interior.
      e. USG Durock Brand Glass-Mat Tile Backerboard.
   2. Core: See Drawings.
   3. Mold Resistance: 10 per ASTM D3273.

2.8 BACKING PLATES

A. Contractor Option: Use manufactured, preformed sheet steel backing, manufactured flexible wood backing system, or flat strap backing plates.

B. Manufactured, Preformed Sheet Steel Backing: 6 inch wide, 68 mil steel, formed to fit stud spacing.
   1. Manufacturers and Products:
      a. ClarkDietrich FastBack Backing System.
      b. Metal-Lite Flush-Mount Metal Stud Backing.
      c. Perfect Wall, Inc. Flush-Mount Flat Reinforced Backing.

C. Flat Strap Backing Plates: Steel sheet screwed to studs.
   1. Width: 6 inches minimum or as needed for secure anchorage of wall mounted items.
   2. Base Steel Thickness: 63 mils minimum where supporting the following items.
      a. Handrails, grab bars, and other items that support live loads.
      b. Fireplace mantles.
      c. Curtains and drapery track.
      d. Headboards.
      e. Wall supported counter tops and cabinets.
      f. Ladders.
      g. Electrical panels.
      h. Electrically operated fixtures, furnishings, or equipment.
      i. Large lighting fixtures.
      j. Wall mounted televisions and monitor screens.
      k. Mirrors.
      l. Large artwork.
   3. Base Steel Thickness: 33 mils minimum where supporting the following items.
      a. Wood trim.
      b. Toilet and bath accessories, other than grab bars.
      c. Small lighting fixtures.
      d. Anchorage for base cabinets.
      e. Small artwork.

2.9 PERFORMANCE

A. Framing Table Selection:
   1. Select stud thicknesses and spacing from manufacturer load and deflection tables to meet performance requirements, including wall mounted element supports such as handrails and wall cabinets.

B. Delegated Design:
   1. Delegate stud framing to manufacturer licensed Professional Engineer.

C. Structural Design Criteria:
   1. Horizontal Partition Load: 10 psf.
   2. Vertical Ceiling Load: Supported material dead load.
   3. Shaft Intermittent Air Pressure Loads: 5 lbf/sq ft.
   4. Partition Horizontal Deflection Limits:
      a. Tile or Stone Finished Partitions: 1/360 of wall height.
      b. Other Partitions: 1/240 of wall height.
   5. Ceiling Vertical Deflection Limits: 1/360 of span.

D. Fire Resistance: Assemblies tested per ASTM E119.
   1. Fire Ratings: See Drawings.

E. Acoustic Performance:
   1. STC: Tested per ASTM E90, classified per ASTM E413. See Drawings for STC ratings.
   2. Sound Transmission Characteristics: For gypsum board assemblies with acoustical ratings, provide materials and construction identical to those outlined in the architectural drawings. Substitutions shall be reviewed by the acoustical consultant and architect. Where alternates are proposed, provide test reports for construction tested in an assembly according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.10 FIRESTOPPING COMPONENTS

A. Wall Head Joint Firestopping: Section 078400.

B. Firestop Track: One of the following types.
   1. Top track manufactured to accommodate structural deflection while maintaining fire resistance rated assembly continuity.
      a. Manufacturers and Products:
         1) CEMCO FAS-Track.
         2) ClarkDietrich Blaze Frame DL 2.
         3) Fire Trak Corp Fire Trak System.
         4) Marino\WARE FAS-Track.
         5) Metal-Lite The System.
   2. Intumescent Firestop Seal: One piece, preformed foam seal fitting over top tracks.
      a. Manufacturers and Products:
         1) Hilti Model CFS-TTS, Firestop Top Track Seal.
         2) Specified Technologies Track Top Gasket.

b. Width: Accommodating track depth.

2.11 ACOUSTICAL FRAMING COMPONENTS

A. Resilient Furring Channels: Asymmetrical, 1/2 inch deep.
   1. Manufacturer and Product:
      a. Clark Dietrich; RC Deluxe Resilient Channel, RCSD, as Basis-of-Design,
      b. Cemco; RC1-XD, Xtra-Duty Resilient Channel.
      c. Or approved equal.

B. Acoustical Furring Clips: Molded rubber and galvanized steel mount clip used to attach furring and gypsum wallboard wall or floor/ceiling assemblies.
   1. Manufacturers and Products:
      a. ClarkDietrich SOUND CLIP.
      b. PAC International RSIC-1.
      c. Pliteq GenieClip.

C. Sound Attenuation Blankets: ASTM C665, Type I, unfaced semi rigid mineral wool , thickness shown on Drawings, sized for friction fit.
   1. Manufacturers and Products:
      a. CertainTeed Corporation Fiber Glass Building Insulation.
      b. Johns Manville Unfaced Fiber Glass Batts.
      c. Knauf Insulation EcoBatt Insulation.
      d. Owens Corning PINK Next Gen Fiberglas Insulation.
      e. Or approved equal.
   2. Substitutions:.
   3. Fire Rated Partitions: Insulation type required by fire resistance designs referenced on Drawings.
   4. Surface Burning Characteristics: ASTM E84.
      a. Flame Spread: 25 maximum.
      b. Smoke Developed: 50 maximum.
   5. Thickness: See Drawings.
      a. Walls: inches.
      b. Ceilings: inches.

D. Acoustic Sealant: ASTM C834; nonsag, paintable, nonstaining, butyl free, latex sealant.
   1. Manufacturers and Products:
      a. Accumetric BOSS 824 Acoustical Sound Sealant.
      b. GE Construction Sealants RCS20.
      c. Grabber Construction Products Acoustical Sealant GSC.
      d. Hilti CS-S SA Light.
      e. Pecora AC-20 FTR or AIS-919.
      f. Specified Technologies Smoke N Sound Acoustical Sealant.
      g. USG SHEETROCK Acoustical Sealant.
      h. Or approved equal.
   2. Substitutions:.
   3. Fire Rated Partitions: Acoustical sealant type required or permitted by fire resistance designs shown on Drawings.

2.12 INSTALLATION COMPONENTS

A. Framing Installation:
   1. Anchors: Framing manufacturer recommended types for substrates.
   2. Fasteners: ASTM C1002; Type S and GA-216; length to suit application.
   3. Tie Wire: ASTM A641, zinc coated, 0.062 inch diameter, minimum.
   4. Acoustic Gaskets: Closed cell foam self-adhesive strips allowing fastener penetration without foam displacement, 1/8 inch thick minimum, widths to match stud sizes.
   5. Exterior Wall Isolation Strips:
      a. Asphalt Saturated Organic Felt: ASTM D226, Type I, 15 lb. asphalt felt, nonperforated.
      b. Foam Gaskets: Closed cell vinyl foam strips with adhesive backing, 1/8 inch thick, width to match stud. No foam displacement at fastener penetration.

B. Interior Trim: ASTM C1047.
   1. Material: Galvanized or aluminum coated steel sheet and rolled zinc.
   2. Shapes: Cornerbead and See Drawings.

C. PVC Trim: ASTM C1047 and ASTM D3678.
   1. Manufacturers:
      a. ClarkDietrich.
      b. Plastic Components.
      c. Trim-Tex.
   2. Shapes: See Drawings.

D. Aluminum Trim: Extruded units.
   1. Manufacturers:
      a. Fry Reglet.
      b. Gordon.
      c. Pittcon Industries.
   2. Finish: Clear anodized.
   3. Profiles: See Drawings.

E. Electrical Box Pads: Moldable non curing one component, intumescent, fire rated material for through penetration fire stop systems and sound attenuation systems; self adhering; 1/8 inch thick, minimum.
   1. Manufacturers and Products:
      a. Kinetics Noise Control Fire-Rated Isobacker.
      b. Specified Technologies SpecSeal Firestop Putty Pads.

F. Thermal Insulation: Section 072100.

G. Gypsum Board Fasteners:
   1. Steel Framing 33 mils Thick and Less: ASTM C1002, Type S, self-piercing tapping screws.
   2. Steel Framing Greater than 33 mils Thick: ASTM C954, self-drilling tapping screws.
   3. Wood Framing: ASTM C1002, Type W.

H. Tile Backer Board and Exterior Gypsum Soffit Board Fasteners: Board manufacturer

standard, corrosion resistant steel.

I. Laminating Adhesive: Recommended type for directly adhering gypsum panels to continuous substrate.

J. Joint Materials:
1. Interior Gypsum Board: ASTM C475; products compatible with substrate and other coatings applied to surface.
a. Skim Coat For Final Coat of Level 5 Finish: Spray applied high build coating.
2. Tile Backer Board: Product recommended by backer unit manufacturer.
3. Exterior Gypsum Soffit Board: Setting type taping compound and setting type, sandable topping compound.

2.13 TEXTURE FINISHES

A. Primer: Texture finish manufacturer standard product.

B. Texture Finish: Ready mixed product for spray, brush, and roller application.
1. Finish Texture: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough-in utilities are in proper locations.

B. Shaft Wall Assemblies: Verify substrates are ready and follow installation tolerances, including structural framing.
1. Verify that elements within shafts are ready to be enclosed.

C. Examine panels for moisture and mold; discard damaged panels.

3.2 PREPARATION

A. Remove sprayed fireproofing to the extent required to install gypsum assemblies. Patch damaged fireproofing.

3.3 INSTALLATION - GENERAL

A. Framing Standard: ASTM C754 and ASTM C840.
1. Portland Cement Plaster Assemblies: Follow ASTM C1063 for additional framing installation.

3.4 INSTALLATION - PARTITION FRAMING

A. Framing to Structure: Extend partition framing to underside of structure. Attach ceiling track to structure.

B. Framing to Ceiling: Extend framing to ceiling. Attach ceiling track to ceiling framing.

C. Framing Without Gypsum Board on Both Faces: Brace stud framing system rigid; attach bridging to prevent stud rotation.

D. Orient stud flanges the same direction within wall assembly.

E. Stud Spacing:
   1. Single Layer Applications: See Drawings.
   2. Multiple Layer Applications: See Drawings.
   3. Tile Backer Applications: See Drawings.

F. Install backing where shown and where supporting wall mounted fixtures, furniture, equipment, or other construction.

G. Fire Resistance Rated Partitions: Tested assembly requirements.

H. Firestop Track: Tested assembly requirements.

I. Acoustic Accessories and STC Rated Assemblies: Follow tested assembly requirements.
   1. Acoustical Sealant Beads: ASTM C919. Close off sound flanking paths.
   2. Electrical Box Seals:
      a. Install seals before installing gypsum board.
      b. Overlap front edge of box so that seals will be compressed around edges of box as gypsum panels are installed.
   3. Sound Attenuation Blankets:
      a. Install after one side of gypsum is installed and mechanical and electrical Work is complete in framing spaces.
      b. Fit tight around cut openings and penetrations, and behind and around electrical and mechanical items.
      c. Pack around door and window frames, between jamb studs, in boxed headers, and in other voids.

J. Deflection Accommodation: Where framing extends to overhead structure, install deflection top track systems to prevent axial loading of finished assemblies.

K. Framed Openings: Follow ASTM C754 for framing above door heads.
   1. Install two studs at each jamb.
   2. Headers: Install track on top of header for installation of cripple studs.

L. Direct Furring:
   1. Anchor furring channels spaced See Drawings to substrate.
      a. Exterior Walls: Install isolation strip between furring and exterior walls.

M. Z-Furring:
1. Apply insulation per Section 072100. Hold insulation in place with Z-furring members spaced at 24 inch centers, anchored to substrate.

3.5 INSTALLATION - SUSPENSION SYSTEMS

A. Suspension System Spacings:
1. Hangers: 48 inches.
2. Main Runners: 48 inches.
3. Furring Channels: 16 inches.

B. Isolate suspension systems from building structure and other objects within ceiling plenum.

C. Wire, Flat, and Rod Hangers: Install plumb.
1. Splay hangers where required to avoid contact with obstructions.
2. Attach securely to building structural elements.
3. Do not connect or suspend from ducts, pipes, or conduit.

D. Large Obstructions: Install supplemental suspension members and hangers, sized to span across obstructions and support ceiling loads.

E. Seismic Bracing: Sway brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Install per ASTM C636.
1. Install additional hanger wires or metal supports at lighting fixtures air vents, and other ceiling-mounted equipment.

3.6 INSTALLATION - FRAMING TOLERANCES

A. Deviation from Indicated Position: 1/8 inch in 10 feet, maximum.

B. Deviation from Plumb and Level: 1/8 inch in 12 feet, maximum.

3.7 INSTALLATION - ELECTRICAL BOX SEALS

A. Install seals before installing gypsum board.

B. Overlap front edge of box so that seals will be compressed around edges of box as gypsum panels are installed.

C. Applications:
1. Electrical boxes in fire barriers, smoke barriers, and STC rated walls.
2. Electrical boxes at interior gypsum board faces of exterior walls.

3.8 INSTALLATION - ACOUSTICALCOMPONENTS

A. Acoustical Insulation:
   1. Fiberglass or mineral fiber batt insulation, friction fit type without integral vapor barrier membrane, thickness as shown on the drawings.
   2. Batt width to match stud spacing for self-supporting friction fit.
   3. Cut to fit irregular spaces.
   4. Butt edges into firm contact with each other and adjoining surfaces.
   5. Cut to fit tightly around openings and penetrations and around and behind electrical boxes.
   6. Pack additional strips of insulation around door and window frames to fill all voids.
   7. Pack around pipes, ducts, conduits, electrical boxes and other penetrating items to fill all voids.
   8. Install above ceilings to form a continuous layer, as shown on the drawings.
   9. Fill voids to create a continuous sound-isolation plane.
   10. Stagger end joints between studs and, where occurs, between two planes of insulation.

B. Penetrations:
   1. Penetrations of building services (e.g., ducts, conduits, pipes) through full height and acoustic rated partitions shall be sealed airtight as detailed below:
      a. Seal all annular openings less than ½ inch with acoustical sealant and backer rod (as required to hold the sealant).
      b. When the annular opening is larger than ½ inch, provide a gypsum board patch to reduce the opening to less than ½ inch, and seal as specified.
      c. Prior to caulking of penetrations, verify that all penetrating elements such as piping and ductwork are free and clear of the opening to be caulked.
   2. Seal the backs and sides of standard electrical back boxes with Esheet Caulking (Electrical Outlet Box Pads).

C. Acoustical Sealant:
   1. Refer to Section 07 84 13 Penetration Firestopping and 07 92 00 Joint Sealants.

3.9 INSTALLATION - INTERIOR GYPSUM BOARD

A. Follow ASTM C840.
   1. Fire Rated Partitions: Install per tested designs referenced on Drawings.
   2. Acoustically Rated Partitions: Install per tested designs referenced on Drawings.

B. Cementitious Backer Units: Follow ANSI A108.11.
   1. Locations: See Drawings.

C. Shaft Wall Liner Panels: Cut panels to accurate dimensions and install sequentially between studs.

D. Cut panels to fit obstructions and openings without tearing face paper or cracking core.

E. Install panels with face side out with lightly butted joints.

F. Stagger joints on opposite sides of partitions.

G. Locate panel ends over support framing.

H. Fit panels to ducts, pipes, conduit, and other penetrations and obstructions with maximum 1/4 inch joints.

I. Attach gypsum board to framing and to supplementary framing and blocking provided for additional support at openings and cutouts.

J. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.

K. Isolate perimeter of non-loadbearing drywall partitions from structural members. Provide 1/4 to 1/2 inch space and trim edge with edge bead. Seal joints with acoustical sealant.

L. Single Layer Installation:
   1. Install panels vertically with long edges on continuous supports.
   2. Attach panels to framing with screws.

M. Double Layer Installation:
   1. Attach base layer to framing with screws.
   2. Offset second layer joints and attach panels with screws.
   3. At walls taller than 10 feet, install panels horizontally and provide control joints at floor lines.

N. Wood Framing: Floating internal corner construction. Float panels over flat grain of wide dimensioned lumber, including floor joists and headers.

3.10 INSTALLATION - EXTERIOR GYPSUM BOARD

A. Install panels perpendicular to supports with staggered end joints.

B. Fit panels with 1/4 inch joints at adjacent construction and penetrations.

3.11 INSTALLATION - TRIM

A. Vertical Trim: Install in single pieces where length is 9 feet or less.

B. Control Joints: Install where shown on Drawings and per ASTM C840 and as follows.
   1. Locations of control and expansion joints in substrate or framing.
   2. Walls:
      a. At changes in backup material.
      b. Above one jamb of doors.
      c. Maximum 30 feet on center.
   3. Ceilings:
      a. At locations where ceiling framing or furring changes direction.

b. Maximum 50 feet on center.

C. Corner Beads: Outside corners.

D. Casings: Install at termination joints with other construction or where edges are exposed.

E. Reveals: Install trim plumb, level, accurately aligned, and fitted neatly with hairline joints.
1. Cut trim with sharp power saw and file cut edges to remove burrs.
2. Miter joint at changes in direction or plane, except that inside corners may be coped.
3. Apply masking tape or other protection to reveal surfaces before starting drywall finishing.
4. Rated Fire and Smoke Barriers and Non-Rated Smoke Partitions: Install reveals to maintain rating.
5. Routing of gypsum board to create reveals is not acceptable.

3.12 GYPSUM BOARD FINISHING

A. Gypsum Board Finishing: ASTM C840.

B. Finish panel joints, inside corners, trim flanges, fastener heads, and surface defects to provide smooth, continuous surfaces of monolithic appearance that are suitable for applied finishes.

C. Do not fill spaces around penetrations through fire resistive assemblies with joint compound. Leave space for firestopping.

D. Finish Levels:
1. Level 1: Surfaces in plenums and other concealed areas.
2. Level 2: Surfaces that receive tile and stone facing.
3. Level 3: Not used.
4. Level 4: Surfaces that receive flat or low sheen paint and wall coverings.
5. Level 5: Surfaces that receive semigloss or gloss paint and surfaces that are in edge lit locations.

E. Exterior Gypsum Board: Fill joints and embed tape with setting type joint compound. Apply first, fill, and finish coats, with third coat being sandable product. Sand between coats and after finish coat.

F. Texture Finishes:
1. Prime surfaces.
2. Mask adjacent surfaces against overspray.
3. Apply to uniform texture and appearance matching approved field Sample.

3.13 IDENTIFICATION

A. Identify fire and smoke rated walls and partitions and other walls required to have protected openings or penetrations.
1. Locations: Within 4 feet of corners and maximum 12 feet between on both sides.

a. In spaces without ceilings, locate signs minimum 10 feet above finish floor and not blocked from view by ducts, structure, or other elements.

2. Signs: Painted stencil signs with minimum 4 inch high letters and 1/2 inch strokes, or as required by authorities having jurisdiction, or approved self adhesive signs.
3. Text: Use following or as required by authorities having jurisdiction.
   a. 1-HOUR FIRE BARRIER – FIRESTOP ALL PENETRATIONS.
   b. 2-HOUR FIRE BARRIER – FIRESTOP ALL PENETRATIONS.
   c. NON-RATED SMOKE PARTITION – SEAL ALL PENETRATIONS.

3.14 ADJUSTING

A. Water-Exposed Products: Remove entire panels; do not cut and patch gypsum board.

3.15 CLEANING

A. Remove spills, spatters, and misapplications of finishing materials as they occur.

B. Repair other finish surfaces damaged during drywall operations.

3.16 PROTECTION

A. Protect adjacent surfaces from gypsum panel compounds, adhesives, and sealants.

B. Protect finished gypsum panels from being marred from ongoing Work.

END OF SECTION

SECTION 093013

CERAMIC TILING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Tiling for walls, base, and floor.

B. Principal Products:
   1. Tile.
   2. Mortar.
   3. Grout.
   4. Stone thresholds.
   5. Waterproofing and crack isolation membrane.
   6. Metal edge strips.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate tile work with floor, partition, and utility work.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Tile and tile trim.
   2. Mortar.
   3. Grout.
      a. Provide initial selection color samples.
   4. Membranes.
   5. Metal trim.

B. Shop Drawings.
   1. Locations of tile and tile patterns.
   2. Locations of control and expansion joints.

C. Samples:
   1. Tile: Full sized samples of each type and color.

2. Metal Trim: 12 inches long section.
3. Stone thresholds: 6 inches long section by full width.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Reports: Field inspection reports.

1.5 QUALITY ASSURANCE

A. Field Samples: Construct floor tile installation and wall tile installation, 48 by 48 inches, minimum size.
   1. Approved samples establish work results standard.
   2. Sample may remain as part of Work.

B. Source Limitations:
   1. Provide mortar and grout for each installation from single manufacturer.

C. Qualifications:
   1. Contractor Supervisor: International Masonry Institute's Foreman Certification.
   2. Installers: International Masonry Institute Advanced Certification for Tile Installers, ACT, certification for installation of membranes and large format tile.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store tile and cementitious materials indoors, elevated above grade.
   2. Prevent liquid materials from freezing.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

PART 2 PRODUCTS

2.1 TILE PRODUCTS

A. Porcelain Floor and Wall Tile: ANSI A137.1.
   1. Manufacturers and Products: See Finish Legend on Finish Plans.
      a. Admin Building:
         1) WT1.
         2) WT2.

b. Maintenance Building:
   1) WT1.
   2) WT2.
2. Tile Size: See Drawings.
3. Color: See Drawings.
4. Mounting: Manufacturer standard edge mounted tile assemblies.
5. Grout Color: See Drawings.

2.2 TRIM AND ACCESSORIES

A. Trim Units: Coordinated with colors, sizes, and coursing of adjoining flat tile.

B. Shapes:
1. Base: Cove.
2. Wainscot Cap: Bullnose.
3. External Corners: Bullnose.
4. Internal Corners: Field butted square corners.

C. Stone Thresholds:
1. Profile: Beveled edges at 1:2 slope with lower edge of bevel aligned with adjacent floor finish.
   a. Height: 1/2 inch maximum above adjacent floor finish.
2. Manufacturers and Products: See Finish Schedule on Drawings.

2.3 METAL TRIM

A. Metal Strips: Transitions and Finishing Edges.
1. Manufacturers: See Finish Schedule on Drawings.
2. Shapes: See Drawings.
3. Height: Align exposed surfaces with tile and setting bed thickness.

2.4 MORTAR MATERIALS

A. Improved Modified Dry-Set Cement Mortar: ANSI A118.15.
1. Manufacturers and Products:
   a. ARDEX N 23.
   b. Custom Building Products MegaLite.
   c. Laticrete 220 Marble Granite.
   d. MAPEI UltraFlex 3.
   e. Merkrete 735 Premium Flex.

2.5 GROUT MATERIALS

A. Source Limitations:
1. Provide mortar and grout for each installation from single manufacturer.

B. Grout - General:
   1. Sanded Grout: Joints over 1/8 inch wide.
   2. Unsanded Grout: Joints 1/8 inch and less.

C. High Performance Cement Grout: ANSI A118.7.
   1. Manufacturers and Products:
      a. ARDEX FL Rapidset.
      b. Custom Building Products Prism Ultimate Performance.
      c. Laticrete PERMACOLOR Select.
      d. MAPEI Ultracolor Plus FA.
      e. Merkrete 820 Merlite.
   2. Color: Architect selected.

2.6 WATERPROOFING AND CRACK ISOLATION MEMBRANE

A. Fluid-Applied Waterproofing and Crack Isolation Membrane: ANSI A118.10 and ANSI A118.12, unreinforced latex-rubber or elastomeric polymer.
   1. Manufacturers and Products:
      a. Custom Building Products RedGard.
      b. Laticrete HYDRO BAN.
      c. MAPEI Mapelastic HPG.
      d. Merkrete Hydro-Guard 1.

B. Accessory Products: Membrane manufacturer primers, adhesives, reinforcing strips, transition mesh, joint sealants, and other products required for a complete installation.

2.7 MISCELLANEOUS MATERIALS

A. Grout Sealer: Non-color enhancing water repellent.
   1. Manufacturers and Products:
      a. Custom Building Products Aqua Mix Penetrating Sealer.
      b. Mapei UltraCare Penetrating Plus Stone Tile and Grout Sealer.
      c. PROSOCO Stand Off STMP.

2.8 SEALANTS

A. Joint Sealants: Specified in Section 079200 "Joint Sealants."
   1. Color: Architect Selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrates are ready to receive tile work, are firm, dry, clean, free of incompatible

coatings, and comply with ANSI A108.01.

3.2 PREPARATION

A. Concrete Substrates: Section 090561.13 "Moisture Vapor Emission Control."
   1. Grind off high spots and projections in substrate.
   2. Remove loose and foreign matter that could impede performance of tile.

3.3 TILE INSTALLATION

A. Install tile and grout per ANSI A108.1 through ANSI A108.10 requirements and TCNA Handbook recommendations.
   1. Install thresholds, edge strips, and trim.

B. Waterproofing and Crack Isolation Membranes: Install per ANSI A108.13 and ANSI A108.17.
   1. Verify that liquid-applied waterproofing membranes have minimum 20-mil dry film thickness.

C. Lay out tile to minimize pieces less than half size. Locate cuts to be inconspicuous.

D. Lay tile to patterns indicated. Do not interrupt tile pattern through openings.

E. Place thresholds or edge strips at locations indicated.

F. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners neatly.

G. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

H. Joint Widths: Not less than recommended by manufacturer, and as follows:
   1. Ceramic Tile: 1/16 inch.
   2. Porcelain Tile: 1/16 inch.

I. Form internal angles and external angles.

J. Install ceramic accessories rigidly.

K. Sound tile after setting. Replace hollow sounding units.

L. Control Joints: Provide control joints at following locations:
   1. Changes in backup material.
   2. Changes in plane.
   3. Over joints in substrate.
   4. Maximum 24 feet on center at interior locations except maximum 8 feet at surfaces exposed to direct sunlight.
   5. Form joints per TCNA Method EJ-171.

M. Install joint backing and joint sealer as specified in Section 079200 "Joint Sealants."

N. Stone Thresholds: Install in same setting material as adjacent floor.

O. Metal Edge Strips: Install where shown on Drawings.

P. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes per Section 079200 "Joint Sealants."

Q. Grout Sealer: Apply to cementitious grout joints. Remove excess.

3.4 CLEANING

A. Cleaning: Clean tile and grout surfaces so they are free of foreign matter. Remove grout residue, smears and haze.

B. Protect tile with kraft paper or other covering to prevent damage and wear. Prohibit foot and wheeled traffic for seven days, minimum, after grouting.

3.5 INSTALLATION SCHEDULE - INTERIOR FLOOR TILE

A. Floors over Concrete - Thinset: Installation Method TCNA F122.
   1. Tile: See Finish Schedule.
   2. Membrane: Fluid-applied.
   3. Bond Coat: Improved Modified dry-set cement mortar.
   4. Grout: High-performance cement grout.

3.6 INSTALLATION SCHEDULE - INTERIOR WALL TILE

A. Walls over Cementitious Backer Board on Metal Studs - Thinset: Installation Method TCNA W244.
   1. Tile: See Finish Schedule.
   2. Bond Coat: Improved Modified dry-set cement mortar.
   3. Grout: High-performance cement grout.

END OF SECTION

SECTION 095113

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Acoustical panel ceilings.

B. Principal Products:
   1. Acoustical panels (AT1).
   2. Suspension systems (AT1).
   3. Drywall-to-ACT transition molding (AT2).
   4. ACT Ceiling trin at "Cloud" ceiling in Admin Meeting Room (AT4).

C. Related Requirements:
   1. Section 092116 Gypsum Board Assemblies for drywall suspension system (AT3).

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

B. Sequencing:
   1. Complete ceiling suspension system and panel installation after overhead HVAC and electrical work are tested and approved.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Acoustical panels.
   2. Suspension grid and trim.
   3. Initial selection color and texture brochure and samples.

B. Shop Drawings.
   1. Show grid layout and panel identification for each acoustical panel ceiling.
   2. Include mechanical and electrical items installed in ceilings.
   3. Installation details for seismic design loads sealed by professional engineer responsible for seismic attachment and bracing design.

C. Verification Samples:
   1. Each acoustical panel type, standard size.
   2. Each suspension grid type, 12 inch lengths with required colors.
   3. Extruded aluminum trim, 12 inch lengths with required colors.

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 using input from the installers of the items involved:
   1. Suspended ceiling components.
   2. Structural members to which suspension members will be attached.
   3. Size and location of initial access modules for acoustical panels.
   4. Items penetrating finished ceiling including the following:
      a. Lighting fixtures.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
   5. Perimeter moldings.

B. Field Quality Control Submittals: Field test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty Documentation.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Licensed Professionals: Registered in the state in which the project is located.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver products until building is fully enclosed.

1.8 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer Warranty:
   1. Acoustical Ceiling Tile: Warrant against product failure.

PART 2 PRODUCTS

2.1 ACOUSTICAL PANELS

A. Acoustical Panels, AT1:
   1. Manufacturers and Products:
      a. USG Corporation,560 Fissured Acoustical Panels; as basis of design.
      b. Or approved equal.
   2. Size: 24 x 24 inches.
   3. Edges: Square.
   4. Color: Architect selected.

2.2 SUSPENSION GRID

A. Non-Fire-Rated Grid, AT1: ASTM C635, intermediate duty.
   1. Manufacturers and Products:
      a. USG Corporation, Donn Brand, DX/DXL Acoustical Suspension System, as Basis-of-Design.
      b. Armstrong World Industries, Inc.
      c. CertainTeed Corporation.
      d. Rockfon.
   2. Manufacturer: Acoustical panel manufacturer.
   3. Material: Steel; ASTM A653 G30 hot dip galvanized.
   4. Flange Caps: Painted steel, 15/16 inch wide.
   5. Cap Color: Architect Selected.

B. Fire-Rated Grid: Same attributes as non-rated grid but listed by UL for fire resistance rating.

C. Main Beams and Cross Tees: ASTM C635, heavy duty, factory punched with cross tee routs, hanger wire holes and clips.

D. Seismic Accessories:
   1. Struts: Manufacturer standard compression struts designed to accommodate seismic forces.
   2. Clips: Manufacturer standard seismic clips designed and spaced to secure acoustical panels in place.

2.3 SUSPENSION SYSTEM ACCESSORIES AND CEILING TRIM

A. Drywall-to-Acoustical Transition Moldings, AT2: One-piece, factory-engineered, roll-formed profile designed to transition between adjacent gypsum board ceiling assemblies and suspended acoustical ceiling systems occupying the same horizontal plane.
   1. Manufacturers and Products: See Finish Legend on Finish Plan.
      a. USG Corporation, Donn Brand, Transition Molding, (for drywall-to-ACT transitions) , as Basis-of-Design.
      b. Or approved equal.
   2. Material: Commercial-quality, hot-dipped galvanized steel compliance.
   3. Profile Configuration: Integrated dual-purpose section combining a shadowline acoustical wall molding receiver channel with a flush drywall taping flange.
   4. Drywall Taping Flange: Flange shall be knurled and perforated to accept standard joint tape and joint compound formulas.
   5. Acoustical Grid Compatibility: Profile engineered for seamless mechanical connection to 15/16-inch (DX/DXL) or 9/16-inch (Fineline DXF/DXT) ceiling suspension systems.
   6. Finish: Factory-applied baked polyester paint.
      a. Color: Flat White.

B. Wall Moldings:
   1. Material: Steel, painted finish matching grid.
   2. Profile: See Drawings.

C. Decorative Ceiling Edge Trim, AT4: Extruded aluminum with concealed attachment to suspension grid and flush, splined joints; factory finished.
   1. Manufacturers and Products: See Finish Legend on Finish Plan.
   2. Manufacturers and Products:
      a. Armstrong Axiom Trim, as Basis-of-Design.
      b. USG Corporation.
      c. CertainTeed Terminus.
      d. Rockfon Infinity.
   3. Height: 6 inches.
   4. Color: See Drawings.
   5. Application: Meeting Room at Admin Building.

2.4 INSTALLATION MATERIALS

A. Hanger Attachment: Five times design load per ASTM C635, Table 1.

B. Wire Hangers: Galvanized steel wire.
   1. Diameter: Sized for three times hanger design load per ASTM C635, Table 1.

C. Rigid Hangers: One of the following types.
   1. Rods: Mild steel, minimum 1/4 inch diameter, hot dip galvanized per ASTM A153.
   2. Flat Strap: Mild steel, minimum 1 by 1/8 inch size, hot dip galvanized per ASTM A153.
   3. Angles: Formed steel sheet, minimum 7/8 inch legs and 0.040 thickness, hot dip galvanized per ASTM A123.

D. Carrying Channels: Cold rolled, C shaped steel channels, minimum 0.053 inch base metal thickness, with minimum 1/2 inch wide flanges.
   1. Depth: 1-1/2 inches.
   2. Protective Coating: G40 hot dip galvanized per ASTM A653.

E. Hold Down Clips: Supplied by ceiling system manufacturer; tested for listed fire rated assemblies.

F. Touch-Up Paint: Manufacturer recommended type, color to match acoustic and grid units.

2.5 PERFORMANCE

A. Surface Burning: ASTM E84 Class A.

2.6 FABRICATION

A. Fabricate decorative edge trim at factory to accurate curves that are free of flat spots, kinks, or other distortion.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that hanger layout will not interfere with other Work.

B. Examine acoustical panels; discard panels that are wet, damaged, or exhibit mold.

C. Verify that major Work above ceiling is complete and inspected before installing grid.

3.2 INSTALLATION

A. Installation Reference Standards:
   1. ASTM C636.
   2. CISCA Ceiling Systems Handbook.
   3. Seismic Standard: ASTM E580.

B. Install ceiling system capable of supporting imposed loads with 1/360 deflection, maximum.

C. Grid Layout:
   1. Locate system on room axis according to reflected plan.
   2. Locate system to balanced grid design with edge units not less than 50 percent of acoustic unit size. Arrange system with long dimension of panels parallel to long dimension of the space.

D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Space hanger wires 48 inches on center, maximum. Install additional hangers as needed to support light fixtures and ceiling supported equipment without exceeding deflection limit.

F. Space hanger rods, straps, or angles 48 inches on center, maximum. Install additional hangers as needed to support light fixtures and ceiling supported equipment without exceeding deflection limit.

G. Carrying Channels: Rigidly fasten to hangers; prevent vertical movement and rotation.

H. Where ducts or other equipment prevent regular spacing of hangers, reinforce hangers to span extra distance or suspend steel channels horizontally and fasten hangers to channels.

I. Install decorative edge trim with plumb faces, concealed fasteners, and aligned joints.

J. Install grid so that components are level and accurately aligned.

K. Support tees on perimeter molding flanges.

L. Perimeter Moldings: Fasten to substrates 16 inches on center, maximum.
   1. Install edge moldings at intersections of ceiling and vertical surfaces in bed of acoustical sealant or with continuous gasket.
   2. Use longest practical lengths.
   3. Outside Corners: Miter or overlap molding.
   4. Inside Corners: Cut flanges and bend webs.
   5. At round obstructions or penetrations install factory-formed closures matching perimeter molding.

M. Rated Ceilings: Install gypsum board and acoustical panels light fixture boxes per UL assembly requirements and fixture ventilation requirements.

N. Lay directional pattern units with pattern running as shown on Drawings.

O. Place acoustical panels flat on the suspension grid, ensuring they are even and un-warped.

P. Cutting Acoustical Panels:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Cut profiles to match factory edges.
   3. Field paint exposed cut edges.

Q. Lay acoustical insulation blankets in close contact to distance of 48 inches on both sides of partitions with acoustical insulation.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will employ independent inspection agency for periodic inspections of seismic rated suspended ceiling grids.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Non-Conforming Work: Make corrections or replace non-conforming work. Reinspect corrected or new work.

3.4 ADJUSTING

A. Touch up minor scratches and abrasions to match factory finish.

B. Provide new components to replace damaged components that cannot be satisfactorily cleaned or repaired.

END OF SECTION

SECTION 095429

SUSPENDED PLASTIC CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Interlocking PVC ceiling panels and trim accessories for for high-moisture, heavy-wash environment in Bus Wash building.

B. Principal Products:
1. Interlocking PVC ceiling panels.
2. Vapor barrier system.
3. Furring and fasteners.
4. Architectural trim and accessories.

C. Related Requirements:
1. Section 07920 "Joint Sealants" for chemically compatible non-sag, mildew-resistant silicone sealants.
2. Section 092116 "Gypsum Board Assemblies." for substrate backing if applicable.
3. Section 099600 "High Performance Coatings" for adjacent finishes.

1.2 REFERENCES

A. Abbreviations and Acronyms:

B. ASTM International (ASTM):
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
3. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

C. Definitions:
1. Sheen Levels: ASTM D523.
a. Flat: Five gloss units at 60 degrees and 10 gloss units at 85 degrees, maximum.
b. Satin: 20 to 35 gloss units at 60 degrees and 35 gloss units minimum at 85 degrees.
c. Semi Gloss: 35 to 70 gloss units at 60 degrees.
d. Gloss: 70 gloss units at 60 degrees, minimum.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate Work results of this Section with ceiling supported elements and ceiling penetrating elements.
   2. Equipment: Provide overhead bus-washing mechanical tracks, drop rods, spray arches, and supply utility lines are provided by the Contractor. The Contractor is fully responsible for field-measuring, layout coordination, framing modifications, and sealing penetrations.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Attendees: Installers of lighting, security, HVAC, and fire-suppression systems.
   3. Additional Agenda Items:
      a. Review substrate condition, moisture barriers, sealing details, and coordination with overhead bus wash mechanical/electrical fixtures.

C. Sequencing:
   1. Complete ceiling suspension system and panel installation after overhead HVAC, electrical, and fire suppression Work is tested and approved.
   2. Complete fabric panel installation after painting.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Manufacturer's technical datasheets, material specifications, and installation instructions for PVC panels, trim profiles, vapor barrier, and fasteners.
      a. Panel fabrication and acoustical properties.
      b. Suspension grid and trim.
   2. Initial selection color and texture brochure and Samples.

B. Shop Drawings.
   1. Detail layout, panel orientation, locations of light-gauge steel furring channels, perimeter trim details, and specific field-engineering methods for sealing penetrations around Owner-furnished mechanical wash tracks.
   2. Include mechanical and electrical items installed in ceilings.
   3. Installation details for seismic design loads sealed by professional engineer responsible for seismic attachment and bracing design.

C. Samples:
   1. Samples for Verification: 12-inch long full-width samples of PVC paneling in specified finish and color, along with samples of each architectural trim component (J-trim, H-trim, Corner trim).

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified fire and material requirements.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Clean-down procedures using industrial high-pressure washing equipment and chemical cleaners.

B. Warranty Documentation.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Ceiling Finish Components: Unused panels plus 2 percent, minimum, of installed materials.
   2. Facing Fabric: Sufficient quantity to replace 6 panels.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm specializing in manufacturing extruded PVC interlocking panel systems with a minimum of 10 years of documented history.

B. Installer Qualifications: An experienced contractor certified or approved by the panel manufacturer, specializing in industrial high-moisture PVC installations.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products after building is fully enclosed.
   1. Deliver materials in manufacturer's original, unopened bundles with labels intact.

B. Handle factory-finished products to avoid damaging units and finishes.
   1. Store panels flat on a level surface in a dry, climate-controlled location. Protect from prolonged direct sunlight and UV degradation prior to installation.

1.10 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Maintain ambient temperature and humidity in installation areas within limits recommended by manufacturer before, during, and after installation.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.11 WARRANTY

A. Manufacturer's Warranty: Standard non-prorated warranty covering manufacturing defects, delamination, cracking, warping, and severe discoloration under standard wash-bay operations.
   1. Warranty Period: 25 years.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Source Limitations: Obtain interlocking PVC Panels, including co-extruded PVC trim profiles, from single source from single manufacturer.

B. Basis-of-Design Manufacturer:
   1. Subject to compliance with requirements, provide Interlocking PVC Panels manufactured by DelPro or an approved equal meeting all dimensional and performance metrics specified herein.

2.2 INTERLOCKING PVC CEILING PANELS

A. DelPro 1638 Interlocking PVC Wall & Ceiling Panels.
   1. Material: 100% exterior-grade virgin PVC formula, extruded into a double-wall tongue-and-groove profile with an internal multi-rib web system. Recycled content or regrind components are strictly prohibited.
   2. Description: Tongue-and-groove, a rib-reinforced interlocking PVC wall & ceiling panel with nailing fins.
   3. Dimensions:
      a. Width: 16 inches (DelPro 1638).
      b. Thickness: 3/8 inch.
      c. Length:
         1) Standard 8’, 10’, 12’, 14’, 16’, 18’, 20’ Custom lengths available.
   4. Outside Surface: Smooth (completely flat tongue-and-groove joints to prevent water retention and facilitate chemical washdown).
   5. Colors: White, Gray or Black.
   6. Performance Characteristics:
      a. Flame Spread / Smoke Developed Rating: Certified Class A under ASTM E84.
         1) Flame Spread Index: 15.
         2) Smoke Developed Index: 450.
      b. Chemical Resistance: Inert to common commercial vehicle wash detergents, degreasers, wheel cleaners, and mild industrial acids/alkalis.
      c. Sanitary Approval: CFIA certified; completely non-porous, non-absorbent, and

resistant to mold, mildew, and bacterial growth.

d. Resistant to mold and mildew.

2.3 VAPOR BARRIER SYSTEM

A. Material: High-performance, multi-layer polyolefin or polyethylene composite vapor barrier membrane complying with ASTM E96/E96M Class I vapor retarder requirements (Permeance rating less than or equal to 0.05 perms).

B. Accessories: High-tack butyl or EPDM seaming tapes and specialized pipe/conduit penetration gaskets compatible with polyolefin substrates.

2.4 FURRING AND FASTENERS

A. Furring Strips: Light-gauge galvanized steel hat channels or non-structural C-stud furring, minimum 25-gauge (preferably 20-gauge for heavy-duty pressure washing environments), complying with Section 09 22 16.

B. Fasteners: Grade 304 or Grade 316 Stainless Steel self-drilling, wafer-head, or pan-head framing screws. Carbon steel or zinc-plated fasteners are strictly prohibited. Fastener length must ensure a minimum 3/8-inch structural penetration into the steel furring channel.

2.5 ARCHITECTURAL TRIM AND ACCESSORIES.

A. General: Provide manufacturer's standard heavy-duty co-extruded PVC trim profiles matching the panel color, density, and chemical resistance characteristics.
   1. Material: 100 percent virgin, exterior-grade PVC.
   2. Color: Matching DelPro 1638 Interlocking PVC Wall & Ceiling Panels.

B. Trim Components:
   1. Large J-Trim: One-piece perimeter trim channel used to receive panel ends at all walls and ceiling terminations.
   2. Two-Piece H-Trim (Division Bar): Heavy-duty longitudinal joint cover used for multi-span butt connections. Base section mounts to furring; top cap snaps firmly in place to provide a high-strength retention mechanism capable of resisting direct pressure-washing.
   3. Inside Corner Trim: Precision profile for internal ceiling transitions or stepped bulkhead drops.
   4. Outside Corner Trim: Heavy-wall protective trim for external bulkhead corners or structural soffit drops.
   5. F-Trim / Base Trim: Perimeter transition profile where indicated on architectural detail sheets.

C. Accessories:
   1. Construction Adhesive: PL200 or Liquid Nails, as recommended by wall panel manufacturer.
   2. Fasteners:

a. Fastening into Metal: Use DFST ~ DelPro Steel Fastener (#10-16 x 1" Master Driller Pan Socket).
b. Staples: Do not use.

3. Joint Sealants: As specified in Section 079200.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine structural framing and framing substrates. Verify that light-gauge steel furring channels are installed perpendicular to the direction of the PVC ceiling panels.

B. Verify that light-gauge steel hat channels/furring are aligned true and flat to within 1/8 inch over 10 feet. Correct any structural deflection before installing the PVC ceiling panels.

C. Verify that major Work above ceiling is complete and inspected before installing grid.

3.2 VAPOR BARRIER INSTALLATION

A. Install the continuous polyolefin vapor barrier membrane directly above or face-applied to the light-gauge steel furring channels prior to panel installation.

B. Overlap all seams by a minimum of 6 inches and seal continuously with manufacturer-approved high-tack butyl tape to form a completely airtight moisture envelope.

3.3 COORDINATION WITH VEHICLE WASH TRACKS

A. Coordinate layout closely with Owner-supplied mechanical tracks. Pre-cut structural clearances around drop rods, overhead track brackets, utility lines, and heavy support struts.

B. Do not anchor PVC ceiling panels directly to any moving or vibrating wash equipment component.

C. Maintain an isolated, independent clearance gap of exactly 3/8 inch around all mechanical track penetration boundaries to absorb vibration, operational drift, and structural stress.

3.4 CEILING PANEL AND TRIM INSTALLATION

A. Furring Spacing: Light-gauge steel furring channels must be spaced at a maximum of 12 inches on center to guarantee structural rigidity against direct automated pressure-washing forces.

B. Trim Preparation (Critical Sealing Protocol): Prior to inserting any PVC panel into an architectural trim channel (J-trim, H-trim, or Corner profile), inject a continuous, non-sagging

bead of 100% silicone sealant inside the receiving cavity.

C. Ceiling Panel Attachment:
   1. Mount panels via the integrated hidden fastening flange.
   2. Drive stainless steel screws straight and flush through the nailing slots into the light-gauge steel channels. Do not overdrive screws; allow panels to slide slightly within the slots to accommodate thermal expansion.
   3. Maintain a 3/8-inch expansion gap at all perimeters, wall intersections, and fixed penetration boundaries.

D. Interlocking Joints: Slide tongue firmly into groove to ensure full alignment. Fully compress joints without forcing, maintaining uniform straight panel lines.

E. Two-Piece H-Trims: Mechanically fasten the H-trim base to the steel furring. Slide panels into place embedded in silicone sealant. Snap the heavy-duty top cap securely into the base to lock down the longitudinal panel joint.

3.5 TOLERANCES

A. Plane: 1/8 inch variation in 10 feet, maximum, measured in any direction.

B. Trim Plumbness: 2 degrees rotation variation, maximum.

3.6 PENETRATION FLASHING AND BOOTING

A. All structural track penetrations, electrical conduits, and piping crossing the ceiling plane must be fully flashed.

B. Install EPDM or butyl rubber pipe boots/gaskets tightly around the penetration. Tape and seal the collar directly to the continuous polyolefin vapor barrier.

C. Apply a thick exterior perimeter bead of 100% silicone sealant at the finished PVC panel surface line to guarantee a complete moisture barrier.

3.7 CLEANING AND PROTECTION

A. Remove any excess silicone sealant immediately from panel faces using manufacturer-approved cleaners that do not mar or etch the PVC finish.

B. Clean finished surfaces with mild soap and water. Do not use abrasive pads or highly concentrated solvent cleaners.

C. Protect the completed installation from damage during subsequent construction operations.

END OF SECTION

SECTION 096500

RESILIENT FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Resilient flooring at Maintenance Building.
   2. Resilient wall base at Admin and Maintenance Buidlings.

B. Principal Products:
   1. Luxury vinyl tile (LVT1).
   2. Rubber wall base (RB1).
   3. Viny wall base (VB1).

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate flooring preparations with Section 090651.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Resilient flooring products.
   2. Resilient accessories.
   3. Installation materials.

B. Shop Drawings.
   1. Special patterns.

C. Product Schedule: Resilient flooring products.

D. Samples:
   1. Resilient Tile Flooring: Full sized Samples of each product.
   2. Resilient Base: 12 inch length of each product.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For resilient flooring.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Resilient Tile Flooring: Unused full tiles plus one box per every 50 boxes installed, but not less than one box.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store resilient flooring indoors and within manufacturer recommended ambient temperature range.
   2. Store resilient sheet flooring rolls upright.
   3. Store resilient tile flooring on flat surfaces.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Establish ambient conditions 48 hours, minimum, before installation; maintain conditions during installation and for 48 hours, minimum, after installation.

PART 2 PRODUCTS

2.1 RESILIENT TILE FLOORING

A. Luxury Vinyl Tile, LVT1: ASTM F3261, textured vinyl tile with rigid polymer core.
   1. Manufacturers and Products:
      a. ManningtonCommercial; Uninterrupted Collection - Wood; as basis of design.
      b. Or approved equal.
   2. Class: III.
   3. Type: B, Embossed.
   4. Wear Layer: Grade I Commercial, 20 mil.
   5. Backing: Composed of solid vinyl compound backing (non-ortho-phthalate plasticizer).
   6. Overall Thickness: 4.0 mm.; under ASTM F1700.
   7. Size: See Drawings.
   8. Features: Micro-beveled edges, Decorative printed layer, and Clear topcoat.
   9. Color: See Drawings.
   10. Installation: Adhered.

2.2 RESILIENT BASE

A. Rubber Base, RB1: ASTM F1861 Type TP.
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
      a. Tarkett (Johnsonite): Duracove, UN206, as Basis-of-Design.
      b. Or approved equal.
   2. Style: B, Cove.
   3. Height: 4 inches.
   4. Color: See Drawings.

B. Vinyl Base, VB1: ASTM F1861, Type TV.
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
      a. Roppe, Vinyl Wall Base, as Basis-of-Design.
      b. Or approved equal.
   2. Style: B, Cove.
   3. Height: 4 inches.
   4. Color: See Drawings.

2.3 RESILIENT MOLDINGS

A. Vinyl Transition Strips:
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
   2. Color: See Drawings.
   3. Profiles: See Drawings.

2.4 PERFORMANCE REQUIREMENTS

A. Fire Test Response Characteristics:
   1. Class I per ASTM E648 or NFPA 253, Critical Radiant Flux Classification.

B. Smoke Density:
   1. Passes ≤ 450 per ASTM E662.

C. Static Load Limit:
   1. Passes 2,000 PSI per ASTM F970; Residual Indentation ≤ 0.005 inches per ASTM F1914.

2.5 INSTALLATION MATERIALS

A. Patching and Leveling Materials: Flooring manufacturer recommended products for applicable substrates.

B. Adhesives: Flooring manufacturer recommended water based product.
   1. VOC Content: 50 g/L, maximum.
   2. Full-spread:
      a. Mannington V-88 Transitional Full Spread Adhesive or MoistureLoc Full Spread.

3. Full Coverage Spray:
    a. Mannington XpressStep for LVT.

C. Sealers and Finish Coats for Resilient Terrazzo Floor Tile: Products recommended by floor tile manufacturer for resilient terrazzo floor tile.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that concrete floors have cured 28 days, minimum.

B. Moisture and Alkalinity Testing: See Section 090561.

3.2 PREPARATION

A. Preparing Concrete Substrates: See Section 090561.

3.3 TILE FLOORING INSTALLATION

A. Mix materials from multiple containers for consistent blend of colors.

B. Lay out tiles so that units at opposite walls are equal width and more than half size.

C. Install tiles in pattern on approved Shop Drawings and directed by Architect.

D. Extend tile into recesses and under equipment.

E. Terminate tile flooring at centerline of doors where adjacent floor finish is dissimilar.

F. Scribe and cut tile for close fit at vertical surfaces so that cut edge will be concealed by wall base or other trim.

G. Install tile with full adhesive coverage.

H. Roll tile to eliminate entrapped air and ensure full adhesion.

I. Install edge strips where tile terminates against dissimilar flooring. Butt end seams tight.

J. Install free-laid flooring securely interconnected and fully seated on substrate.

3.4 BASE INSTALLATION

A. Installation:
    1. Form tight joints.

2. Align the tops of bases with adjacent units.
3. Ensure continuous contact between base and substrate. Fill voids between base and substrate with manufacturer recommended filler material.
4. Do not stretch base.

B. Job Formed Corners:
1. Outside Corners: Form bends without discoloration in corners.
2. Inside Corners: Cope.

3.5 CLEANING AND PROTECTION

A. Remove excess adhesive.

B. Do not allow traffic on flooring until adhesives have fully set.

C. Provide surface protection during construction period.

END OF SECTION

SECTION 096723

RESINOUS FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Quartz Granule Flooring (ESC1):
      a. Restrooms in the Admin Building.
   2. Cementitious Polyurethane Flooring (SC2-SC6):
      a. Maintenance Building.

B. Principal Products:
   1. Multi-component, seamless decorative hybrid flooring system consisting of a moisture-tolerant cementitious polyurethane slurry body coat, a double broadcast of decorative colored quartz aggregate, and a high-performance clear topcoat (ESC1).
   2. Seamless, self-leveling slurry, cementitious polyurethane (urethane) mortar flooring system with a broadcast aggregate texture (SC2).

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Attendees: Manufacturer technical representative.
   3. Additional Agenda Items:
      a. Substrate preparation.
      b. Treating cracks and joints in substrate.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's technical data sheets, installation instructions, and Safety Data Sheets (SDS) for each component.
   2. Initial selection color Samples.

B. Schedule: List products and installation areas.

C. Samples:
   1. Resinous Flooring: 6 by 6 inch of each system and color and texture. Apply to plywood backing. Step back coats.
   2. Termination Trim: 6 inch lengths of each material and profile.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements:
   1. Applicator Qualifications: Contractor shall be approved/licensed in writing by Manufacturer to install the specified flooring system.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For resinous flooring systems.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer trained and approved.
   2. Field Technical Representatives: Employed by manufacturer.

B. Field Samples: Construct 4 by 4 foot sample for each flooring type with one inside corner. Demonstrate color, texture, and integral cove base.
   1. Simulate final lighting conditions if permanent luminaires have not been installed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in installation areas for three days before installation to achieve temperature stability.

1.8 FIELD CONDITIONS

A. Concrete substrate shall be fully cured a minimum of 28 days, sound, clean, and dry.

B. Vapor Transmission: Moisture vapor emission rate shall not exceed 20 lbs/1,000 sq. ft./24 hours per ASTM F1869, or 85% RH per ASTM F2170, unless approved by the manufacturer.

C. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Maintain material and ambient temperature between 65 and 85 degrees F during application and curing periods.

PART 2 PRODUCTS

2.1 RESINOUS FLOORING - GENERAL

A. Source Limitations:
   1. Obtain resinous flooring system materials, including primers, resins, hardening agents, grouting coats, aggregate broadcast, topcoats, and sealers through one source from a single manufacturer.

2.2 DECORATIVE QUARTZ FLOORING SYSTEM

A. Quartz Granule Flooring, ESC1: Seamless flooring system with 6" integral cove base; decorative, colored-quartz hybrid flooring system and clear urethane wear coat.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide.
      a. Dur-A-Flex, Inc.; Hybri-Flex EQ Q28, (a Sherwin-Williams High Performance Flooring Brand) resinous flooring system.
   2. Acceptable Comparable Manufacturers: Subject to compliance with requirements, products by one of the following manufacturers may be provided:
      a. Sika Corporation; Sikafloor PurCem Gloss Quartz System.
      b. Stonhard Stonblend HDF System.
      c. Or approved equal.
   3. System Type: Multi-component, seamless decorative hybrid flooring system consisting of a moisture-tolerant cementitious polyurethane slurry body coat, a double broadcast of decorative colored quartz aggregate, and a high-performance clear topcoat.
   4. Overall Thickness: 3/16 to 1/4-inch.
   5. Color Blend: See Finsih Legend.
   6. Finish Texture: Architect selected.

B. Physical Performance Benchmarks:
   1. Compressive Strength: Minimum 12,500 psi when tested per ASTM C579 (Matrix value 17,500 psi per ASTM D695).
   2. Tensile Strength: Minimum 4,000 psi per ASTM D-638.
   3. Flexural Strength: Minimum 6,250 psi when tested per ASTM D-790.
   4. Hardness (Shore D): 75-80v per ASTM D-2240.
   5. Moisture Vapor Tolerance: System must be engineered to handle moisture vapor emission rates (MVER) up to 20 lbs. per 1,000 sq. ft. / 24 hours per ASTM F1869, or 99% Relative Humidity (RH) per ASTM F2170 without priming or failure.
   6. Adhesion / Bond Strength: Minimum 400 psi per ASTM D4541 (or 100% concrete failure).
   7. Impact Resistance: Greater than 160 in-lbs per ASTM D-2794.
   8. VOC Content: Maximum 5 g/L for base systems, 0 g/L for topcoats.

C. Components & Application Sequence:
   1. Optional Primer: Poly-Crete TF Plus (Required only for highly porous concrete substrates).
   2. Base Slurry Body Coat: Poly-Crete SL (or Poly-Crete MD SL), a self-leveling polyurethane-cement matrix applied at 1/8-inch thickness.

3. First Quartz Broadcast: Factory-blended, fine-grade multi-color ceramic-coated granules, broadcast to saturation/refusal into the wet slurry.
    a. Product Formulation: Dur-A-Flex Q28 Quartz Aggregate.
    b. Color Blend Designation: Marina.
4. Second Broadcast Coat: 100% solids, clear, low-odor epoxy formulation designed for high-clarity aggregate retention, utilizing Dur-A-Flex Dur-A-Glaze #4.
5. Second Quartz Coat : Matching Q28 Fine Quartz Aggregate broadcast to saturation/refusal into the wet second coat.
6. Grout/Lock Coat: Clear Dur-A-Glaze #4 Water Clear epoxy-based grout coat.
7. Topcoat: Armor Top, a high-solids, gloss or satin finish, UV-stable and chemical-resistant aliphatic polyurethane wear layer.

D. Integral CoveBase.
1. System Design: Provide a seamless, radius-style integral cove base extending up adjacent vertical wall surfaces.
    a. Height: 6 inches nominal above the finished floor surface, unless otherwise indicated on drawings.
    b. Construction: Fabricated using a mix of clear epoxy resin (Dur-A-Flex Cove Resin) and Q28 Quartz Aggregate in color blend 'Marina', tightly troweled into a cove base matrix over a neat primer coat.
    c. Termination: Top edge finished clean into a plastic or zinc cove strip, or terminated into a routed wall reglet as approved by the architect.

E. Accessory Materials:
1. Shallow Fill and Patching: Use Sherwin-Williams Poly-Crete MD (up to ¼ inch).
2. Deep Fill & Sloping Compound: Poly-Crete® WR cove/detail matrix or Cemlastic UM (for depths over 1/4 inch).
3. Integral Cove Base: Retardant wall-matrix resin to create an integral 4-inch or 6-inch sanitary cove base matching the floor texture and color system.

2.3 CEMENTITIOUS POLYURETHANE MORTAR FLOORING SYSTEM

A. Cementitious Polyurethane Flooring, SC2-SC6: Seamless flooring system with 6" integral cove base; self-leveling slurry cementitious polyurethane, broadcast with silica quartz aggregate and an aliphatic chemical-resistant polyurethane top coat.
1. Basis-of-Design Product: Subject to compliance with requirements, provide:
    a. Neogard, Neocrete SL Broadcast System, a division of Hempel.
2. Acceptable Comparable Manufacturers: Subject to compliance with requirements, products by one of the following manufacturers may be provided:
    a. Sherwin-Williams High Performance Flooring, Poly-Crete MDB.
    b. Sika Corporation, Sikafloor PurCem SLB+.
    c. Or approved equal.
3. System Type: Seamless, self-leveling slurry, cementitious polyurethane (urethane) mortar flooring system with a broadcast aggregate texture.
4. Overall Thickness: 3/16 to 1/4-inch.
5. Color Blend: See Finsih Legend.
6. Finish Texture: Architect selected.

B. Physical Performance Benchmarks:
   1. Cured Cementitious Polyurethane Slurry Base Layer Properties:
      a. Compressive Strength (ASTM C579): 7,700 psi.
      b. Tensile Strength (ASTM C307): 712 psi.
      c. Flexural Strength (ASTM C580): 2,200 psi.
      d. Service Temperature Range: -120°F to 210°F (-84°C to 99°C); capable of resisting thermal shock.
      e. Environmental Impact: SCAQMD VOC Compliant (8.4 g/L).
   2. Cured Topcoat Layer Properties:
      a. Type: Ultra-high solids, light-stable aliphatic polyurethane with premium stain, impact, and chemical resistance.
      b. Compliance: USDA compliant for incidental food contact; meets local VOC regulations for floor coatings.

C. Components & Application Sequence:
   1. Cementitious Polyurethane Slurry Base Layer: Neogard Neocrete SL (Hempel Product Code 48012), composed of the following items:
      a. Resin: 70800 series - Color: Gray.
      b. Hardener: 70801.
      c. Powder: Neocrete SL 70804.
   2. Broadcast Aggregate: Flintshot Silica Quartz Sand, 20/40 mesh size, clean, washed, and dry - Color: TBD.
   3. Chemical Resistant Topcoat Mix (Optional):
      a. Resin: 70800: 48019.
      b. Hardener: 70801.
      c. Powder: Neocrete SL 70804.
   4. Fumed Silica: P1934.

D. Components & Application Sequence:
   1. Base Slurry: Self-leveling polyurethane-cement resin combined with engineered aggregate matrix.
   2. Aggregate Broadcast: Saturated to refusal with clean, dry, washed quartz or silica sand aggregate.
   3. Topcoat/Lock Coat: High-solids, chemically resistant polyurethane or polyaspartic seal coat.

E. Integral CoveBase.
   1. System Design: Provide a seamless, radius-style integral cove base extending up adjacent vertical wall surfaces.
      a. Height: 6 inches nominal above the finished floor surface, unless otherwise indicated on drawings.
      b. Construction: Fabricated using a mix of clear epoxy resin and aggregate in same color blend as flooring, tightly troweled into a cove base matrix over a neat primer coat.
      c. Termination: Top edge finished clean into a plastic or zinc cove strip, or terminated into a routed wall reglet as approved by the architect.

F. Accessory Materials:
   1. Materials such as cleaning agents, adhesives, closed cell backer rod, deck drains, and others, shall be compatible with the specified Neocrete SL system.

2.4 PERFORMANCE REQUIREMENTS

A. Fire Performance:
   1. Surface Burning Performance: ASTM E84 Class A.
   2. Flame Spread Index: 25, maximum.
   3. Smoke Developed Index: 450, maximum.

B. Dynamic Coefficient of Friction: Tested per ANSI A137.1 DCOF AcuTest.
   1. Level Floor Surfaces: 0.42, minimum.
   2. Ramp Surfaces: 0.80, minimum.

C. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC A117.1, and state accessibility code.

2.5 INSTALLATION MATERIALS

A. Substrate Patching Material: Resinous product approved by flooring manufacturer and recommended by manufacturer for Project applications.

B. System Components: Supply primers, aggregate, and cove base material by resinous flooring manufacturer.

C. Joint Sealants and Backer Rods: Flooring system manufacturer recommended products.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that concrete floors have cured minimum 28 days, minimum.

B. Moisture and Alkalinity Testing: See Section 090561.

C. Verify that concrete surfaces are free from curing membranes, hardeners, surface sealers, oils, grease, or other compound films that could interfere with chemical adhesion.

3.2 PREPARATION

A. Concrete Substrates: Section 090561.

B. Mechanical Surface Prep: Prepare concrete floors using dustless shot-blasting or planetary

diamond grinding machinery to achieve an International Concrete Repair Institute (ICRI) concrete surface profile (CSP) within the range of 3 to 5.

C. Joint and Crack Engineering: Rout out and clear structural cracks, cold joints, and non-moving control joints. Fill and bridge prepared cavities using a semi-rigid structural epoxy or specialized urethane joint filler compound specified by Manufacturer.

D. Clean substrate of dirt, dust, and substances that impede adhesive bond per ASTM D4258.

3.3 INSTALLATION - GENERAL

A. Cove Base Fabrication: Prior to installing horizontal flooring components, prime vertical surfaces and install the 6-inch integral cove base using the dedicated cove resin and approved aggregate blend. Trowel smoothly to form a tight, consistent radius transition at the floor-wall intersection.

B. Apply system components in manufacturer-required order to form a seamless waterproof system of uniform thickness, texture, and appearance.

C. Penetrations: Provide cove transition and extend flooring to height of wall base.

D. Waterproof and seal at floor drain terminations and penetrations.

E. Cove Base Installation:
1. Install integral cove transitions to wall surfaces and cove profile at inside corners.
2. Cove Radius: 3/4 inch.
3. Base Height: 6 inches.
4. Apply system to vertical surfaces to uniform height above floor; make level, straight termination lines.
5. Install wall receiver trim level; adhere to substrate.

3.4 INSTALLTION SEQUENCE - DECORATIVE QUARTZ (ESC1)

A. Cove Base Fabrication: Prior to installing horizontal flooring components, prime vertical surfaces and install the 4-inch integral cove base using the dedicated cove resin and Marina Q28 quartz aggregate blend. Trowel smoothly to form a tight, consistent radius transition at the floor-wall intersection.

B. Base Slurry Coat: Combine and distribute the Poly-Crete MD/SL cementitious urethane slurry over substrate floors using a calibrated screed rake or notched trowel. Immediately roll out surface voids using a loop roller.

C. First Quartz Broadcast: Uniformly throw the Q28 colored quartz aggregate (Marina blend) into the wet cementitious urethane slurry until excess saturation is achieved. Allow a full cure cycle, then sweep and vacuum clean unbonded aggregate.

D. Second Broadcast Step: Mix and roll an intermediate layer of clear Dur-A-Glaze #4 epoxy

resin across the floor. Perform a secondary double-broadcast of the Marina Q28 quartz aggregate to saturation. Allow to fully cure, then sweep and vacuum clean residual loose aggregate.

E. Grout Seal Coat: Squeegee and back-roll clear Dur-A-Glaze #4 epoxy grout resin over the textured surface to seamlessly fill and anchor the quartz aggregate matrix.

F. Armor Top Gloss Finish: Mix and uniformly distribute the clear Dur-A-Flex Armor Top polyurethane topcoat. Ensure the factory Dur-A-Flex Grit is mechanically suspended within the resin throughout application to yield a uniform, slip-resistant Gloss finish across the entire floor layout.

3.5 INSTALLTION SEQUENCE - CEMENTITIOUS POLYURETHANE (SC1)

A. Mixing Slurry Base Layer: Mix Neocrete SL Resin (Part A) and Hardener (Part B) thoroughly using a low-speed drill and Jiffler blade for 1 minute. Gradually add the Powder Aggregate (Part C) and blend for an additional 2 to 3 minutes until uniform and lump-free.

B. Mixing High Solids CRU Topcoat: Pre-mix base component, then combine base and curing agent in exact volumetric proportions provided by the manufacturer. Mix thoroughly for 3 minutes before application.

C. Slurry Base Layer: Apply mixed Neocrete SL onto the prepared concrete substrate using a gauge rake or pin squeegee. Immediately back-roll with a spiked roller to release entrapped air and level the slurry to a flat, cohesive 3/16" nominal film thickness.

D. Aggregate Broadcast: While the slurry base layer is still completely wet and fluid, broadcast the 20/40 Flintshot silica quartz sand to complete saturation (refusal) at an approximate application rate of 0.5 to 0.75 lbs/sq. ft. Avoid clumps or wave lines. Allow to cure completely for 8 to 12 hours.

E. Sweep and Prep: Once cured, aggressively sweep and vacuum away all loose, un-bonded aggregate sand. Lightly sand or scrape any prominent or irregular high spots to ensure an even texture.

F. CRU Topcoat: Apply the mixed Neogard High Solids CRU topcoat over the texturized aggregate bed using a flat squeegee and back-roll with a high-quality shedding-resistant roller at a rate of approximately 150 to 200 sq. ft./gallon (yielding roughly 8 wet mils) to lock in the aggregate and seal the system to the specified finish texture.

3.6 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Material Testing: Test products for compliance with requirements, using applicable referenced

testing procedures or, if not referenced, using testing procedures listed in manufacturer product data.

C. Nonconforming Work: Make corrections or replace and retest.

D. Manufacturer Services: Arrange for manufacturer technical representative to inspect installations immediately before Substantial Completion and provide written reports.

3.7 CLEANING

A. Cleaning: Clean spills and misapplications immediately as they occur.

3.8 PROTECTION AND CURE

A. Curing Envelope: Secure and isolate completed installation areas from all trades, dust, moisture, and debris.

B. Cure Schedule at 75°F (23°C).
   1. Foot Traffic: Allow a minimum of 12 to 24 hours.
   2. Full Chemical/Mechanical Service: Allow 48 to 72 hours before normal heavy usage.

C. Provide temporary protection where exposed to wheeled traffic or frequent foot traffic.

END OF SECTION

SECTION 096813

TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Tile carpeting at Admin and Maintenance Buildings.

B. Principal Products:
   1. Modular tile carpeting (CPT1).
   2. Walk off carpet tile (WCPT).
   3. Adhesive.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Each type of modular carpet tile.
   2. Edgings.
   3. Initial selection color and pattern samples.

B. Shop Drawings: Mark information on copies of floor plans.
   1. Starting points for layout and alignment of tiles.
   2. Pattern directions.
   3. Type, color, and location of insets and borders.
   4. Type, color, and location of edge, transition, and other accessory strips.

C. Schedule: Modular carpet tile types.

D. Samples:
   1. Carpet Tiles: Full sized samples of each type.
   2. Edging: 12-inch long sections.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty documentation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: International Certified Flooring Installers Commercial II certification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store products inside building.

1.6 FIELD CONDITIONS

A. Do not start installation until painting and similar finish work are complete.

B. Ambient Conditions:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

1.7 WARRANTY

A. Manufacturer Warranty:
   1. Carpet Tile: Warrant against product failure.
   2. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 CARPET TILE

A. Walk Off Carpet Tile, CPT1:
   1. Manufacturers and Products: See Finish Legend and Finish Plan on Drawings.
   2. Size: See Finish Legend on Drawings.
   3. Color: See Finish Legend on Drawings.
      a. Determination of acceptance of comparable colors and styles will be at discretion of Owner and Architect.
   4. Applied Treatments:
      a. Soil Resistance Treatment: SSP Shaw Soil Protection.
      b. Antimicrobial Treatment: Manufacturer standard.
   5. Installation Pattern: See Finish Plan on Drawings.

2.2 WALK OFF CARPET TILE

A. Walk Off Carpet Tile, WCPT:
   1. Manufacturers and Products: See Finish Legend and Finish Plan on Drawings.
   2. Size: See Finish Legend on Drawings.

3. Color: See Finish Legend on Drawings.
    a. Determination of acceptance of comparable colors and styles will be at discretion of Owner and Architect.
4. Applied Treatments:
    a. Soil Resistance Treatment: SSP Shaw Soil Protection.
    b. Antimicrobial Treatment: Manufacturer standard.
5. Installation Pattern: See Finish Plan on Drawings.

2.3 PERFORMANCE

A. Fire Characteristics:
1. Critical Radiant Flux Classification: Class II, 0.22 W/sq. cm.
2. Flammability: Pass DOC FF-1 Pill Test.

2.4 INSTALLATION MATERIALS

A. Substrate Patching and Leveling: Latex-modified hydraulic cement product.

B. Adhesive: Waterproof, mildew-resistant, latex-based adhesive formulated specifically for installing carpet tiles.
1. VOC Content: 50 g/L, maximum.

C. Edgings:
1. Profiles: See Drawings.
2. Material: Extruded aluminum.
    a. Finish: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that concrete floors have cured minimum 28 days.

B. Test floors per Section 090561.13 "Moisture Vapor Emission Control" to verify that moisture content and alkalinity are within limits recommended by carpet tile manufacturer.
1. Where testing indicates that the concrete slab exceeds moisture content or alkalinity limits, treat floor per Section 090561.13 "Moisture Vapor Emission Control" and retest.

3.2 PREPARATION

A. Concrete Substrates: Comply with Section 090561.13 "Moisture Vapor Emission Control."

B. Fill cracks, voids, and surface irregularities flush and smooth.

C. Grind ridges and high spots flush and smooth.

D. Clean substrate of dirt, dust, and substances that impede adhesive bond per ASTM D4258.

3.3 INSTALLATION

A. Reference Standard: CRI 104, Section 18, "Modular Carpet Modules".
   1. Installation Method: As recommended by carpet tile manufacturer for Project applications.
   2. Installation Method: Glue-down; install every tile with releasable adhesive.

B. Lay out each room or area to minimize tiles less than one half size.

C. Mix carpet tiles from different cartons to minimize variations in color.

D. Cut tile clean. Fit tiles tight to intersection with vertical surfaces without gaps.

E. Lay carpet tiles with pile direction running in one direction as directed by Architect.

F. Locate change of color or pattern between rooms under door centerline.

G. Bind cut edges where not concealed by edge strips.

H. Edgings:
   1. Install strips where carpet tiles abut dissimilar flooring materials.
   2. Center strips under doors where carpet tiles terminate at door openings.
   3. Adhere strips to subfloor in longest practical lengths; butt ends tight.
   4. Scribe to abutting surfaces.

3.4 CLEANING

A. Remove soiling and stains.

B. Cut loose threads flush with top surface.

C. Clean with commercial vacuum cleaner.

3.5 PROTECTION

A. Protect carpet tile against soiling and wear during remaining construction period.

B. Provide hardboard or other rigid panel protection where subject to wheeled or heavy foot traffic.

END OF SECTION

SECTION 097700

SPECIAL WALL SURFACING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Interior architectural wall cladding system.

B. Principal Products:
   1. Metal linear reveal panel system.
   2. Linear reveals.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting two weeks, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Panel products.
   2. Adhesives.
   3. Manufactured trim profiles and components.
   4. Hardware.
   5. Initial selection color charts and samples.

B. Shop Drawings:
   1. Dimensioned plans and elevations showing special wall surfacing elements and locations.
   2. Show materials, profiles, assembly methods, joint details, fastening methods, sizes and locations of cutouts and finishes.

C. Samples:
   1. Hardware and trim: Each type and finish.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Deliver after HVAC system is operating at occupancy levels.
   2. Protect from exposure to smoke and other odor contamination.

3. Open cartons to condition panels to ambient temperature and humidity 24 hours minimum before installation.

1.5 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Installation area permanent or temporary equivalent lighting is operational.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 ARCHITECTURAL WALL CLADDING SYSTEM

A. Description: Wall cladding system including infill panels, trim, clips, fasteners, terminations, and accessories.
   1. Manufacturer and Product:
      a. Monarch Metals, Inc. Snap Metal Panel System.
   2. Accessories:
      a. Metal Edge Trim: Monarch Metal, Inc. ET075-L.
      b. Vertical Reveal: Monarch Metal, Inc. EPS-V075-L.
      c. Horizontal Reveal: Monarch Metal, Inc. EPS-H075-L.
      d. Metal Z-Clips: Monarch Metal, Inc. MF375.

2.2 FABRICATION

A. Fabricate trim in factory with mitered and welded connection pieces at intersections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify layout of panels will not interfere with other work.
   1. Verify alignment of walls is acceptable to manufacturer installation requirements.

3.2 INSTALLATION

A. Install panels level and in plane with adjacent panels. Follow manufacturer written instructions.

B. Tolerances:
   1. Plumb, Level: 1/16 inch maximum variation.
   2. Joint Width: 1/16 inch maximum variation.

3.3 CLEANING

A. Cleaning: Clean exposed and semi-exposed surfaces of special wall surfacing.

B. Touch up shop-applied finishes. Replace damaged items that cannot be repaired.

3.4 PROTECTION

A. Protection: Protect installed special wall surfacing from damage due to subsequent construction operations.

END OF SECTION

SECTION 099100

PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Painting interior substrates:
      a. CMU, dry environments.
      b. CMU, wey environments.
      c. Gypsum board walls.
      d. Gypsum board ceilings.
      e. Overhead construction.

B. Principal Products:
   1. Interior latex primers.
   2. Interior latex enamels.

C. Related Requirements.
   1. Section 099600: High-Performance Coatings for high-performance coating (HPC) systems applied to all interior and exterior steel (non-galvanized) and galvanized steel fabrications.
   2. Section 099733: Concrete Floor Sealer for interior exposed concrete floors.

1.2 REFERENCES

A. Definitions:
   1. Sheen Levels: ASTM D523.
      a. Flat: Five gloss units at 60 degrees and 10 gloss units at 85 degrees, maximum.
      b. Eggshell: 10 to 25 gloss units at 60 degrees and 10 to 35 gloss units at 85 degrees.
      c. Satin: 20 to 35 gloss units at 60 degrees and 35 gloss units minimum at 85 degrees.
      d. Semigloss: 35 to 70 gloss units at 60 degrees.
      e. Gloss: 70 gloss units at 60 degrees, minimum.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data.
   1. Initial selection color charts, chip sheets, or paint fan decks.

B. Samples:
   1. Draw Down Samples: Each type of paint system and each topcoat color and gloss.
      a. Label each Sample for paint system, location, and substrate.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Cleaning, touch up, and repair instructions for painted and coated surfaces.
   2. Area summary with finish schedule and Samples, designating where each product, color and finish was used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Paint from same product run as installed materials.
      a. Quantity: 5 percent, but not less than 1 gallon of each material and color.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store paint products in sealed containers until ready for use.

1.8 FIELD CONDITIONS

A. Apply materials only when surface and ambient temperatures are within temperature ranges required by paint product manufacturer.

B. Apply exterior coatings when rain or snow are not occurring or forecasted, and when relative humidity is inside humidity ranges, and moisture content of surfaces is within acceptable levels required by paint product manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. BEHR.
   2. Benjamin Moore.

3. PPG Paints.
4. Scuffmaster.
5. Sherwin-Williams.
6. Tnemec.

B. Products: Scheduled in this Section.

2.2 PAINT, GENERAL

A. Colors: Basis of design manufacturer designations, see Finish Legend on Drawings.

B. Paint Systems: Primers, intermediate coats and topcoats compatible with substrates and one another.

C. Coatings: Ready mixed or field catalyzed.

D. Preparation:
1. Mix to soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
2. Blend tints and catalyzers to uniform consistency and color, capable of drying or curing free of streaks or sags.

2.3 SOURCE QUALITY CONTROL

A. Tests:
1. Testing: Owner will engage a testing agency to sample paint materials delivered to Project site or taken from Supplier facility.
2. Acceptance Criteria: Products follow specified requirements.

B. Non-Conforming Work: Remove materials from substrates, pay for testing replacement products, and repaint surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify substrates are ready to receive Work.

B. Preinstallation Testing: Test moisture content of substrate does not exceed the following:
1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Portland Cement Plaster: 12 percent.
4. Gypsum Board: 12 percent.

C. Gypsum Board: Verify finishing compound is dried and sanded smooth.

D. Concrete: Verify surface has cured at least 30 days and surface pH is between 6 and 9.

3.2 PREPARATION

A. Surface Preparation: Remove electrical plates, hardware, trim, escutcheons, and fittings. Correct defects in substrates capable of affecting Work.

B. Cleaning: Remove substances that could impair paint bond, including dust, oil, grease, and incompatible coatings.
   1. Impervious Surfaces: Remove mildew by scrubbing with cleaning solution recommended by finish coating manufacturer. Rinse with clean water and allow surface to dry.
   2. Aluminum Surfaces: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
   3. Asphalt, Creosote, or Bituminous Surfaces: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
   4. Concrete Floors: Follow manufacturer recommendations.
   5. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
   6. Plaster Surfaces: Fill cracks, holes, and other imperfections with latex patching plaster. Blend texture with adjacent surfaces. Clean and allow to dry.
   7. Concrete and CMU Surfaces: Remove dirt, loose mortar, scale, efflorescence and chalk. Remove oil and grease by scrubbing with cleaning solution recommended by finish coating manufacturer. Rinse with clean water and allow surface to dry.
   8. Non-Passivated Galvanized Surfaces: Smooth and hand or power tool clean per ASTM D6386.
   9. Wood Surfaces:
      a. Wipe off dust and grit. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried.
      b. Backprime concealed surfaces.

3.3 APPLICATION

A. Follow manufacturer instructions for application method, thickness of coatings, and number of coats.
   1. Apply finishes when surfaces are dry. Allow applied coats to dry before next coat is applied.
   2. Apply each coat of paint slightly darker than preceding coat.
   3. Apply coatings to uniform appearance.
   4. Sand wood and metal surfaces lightly between coats.
   5. Leave testing agency, equipment identification, and performance labels unpainted.

B. Appearance:
   1. Apply paints without imperfections.
   2. Edges and Color Breaks: Produce sharp edges.

3.4 PAINTING MECHANICAL EQUIPMENT

A. Paint the following equipment when exposed in occupied spaces and exterior areas:
   1. Electrical panelboards and switchgear.
   2. Piping.
   3. Ductwork.
   4. Pipe hangers.
   5. Conduit.
   6. Unfinished tanks.
   7. Shop-primed equipment.

B. Paint interior surfaces of air ducts visible through grilles with one coat of flat black paint.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Testing: Dry film thickness.

C. Non-Conforming Work: Remove and replace or apply additional coats, and retest.

3.6 CLEANING

A. Remove rubbish, empty cans, rags, and other discarded materials.

B. Remove splattered paints. Protect adjacent surfaces from damage.

3.7 PROTECTION

A. Protect painted surfaces from subsequent Work. Touch up and restore damaged painted surfaces.

3.8 INTERIOR PAINTING SCHEDULE

A. CMU Substrates, Dry Environments:
   1. Latex Block Filler:
      a. BEHR: Behr Pro Block Filler Primer, PR50.
      b. Benjamin Moore: Ultra Spec Masonry Hi-Build Block Filler 571.
      c. PPG Paints: 6-7 Speedhide Latex Block Filler.
      d. Sherwin-Williams: PrepRite Latex Block Filler, B25W25.
      e. Sika-UGL Drylok Extreme.
      f. Tnemec: Series 54 Masonry Filler.
   2. Acrylic Latex Enamel: Eggshell finish.

a. BEHR: Behr Pro i300 Interior.
b. Benjamin Moore: Ultra Spec 500 Series.
c. PPG Paints: SPEEDHIDE Zero Interior Latex.
d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.
e. Sika-UGL Drylok Extreme.
f. Tnemec: Series 1029 Enduratone low semigloss.

B. CMU Substrates, Wet Environments:
1. Block Filler:
a. BEHR: Behr Pro Block Filler Primer, PR50.
b. Benjamin Moore: Corotech Waterborne Epoxy Block Filler 163.
c. PPG Paints: Perma-Crete Concrete Block & Masonry Surfacer/Filler.
d. Sherwin-Williams: Pro Industrial Heavy Duty Block Filler, B42W00150.
e. Sika-UGL Drylok Extreme.
f. Tnemec: Series 130 Envirofill.
2. Acrylic Latex Topcoat: Flat finish.
a. BEHR: DRYPLUS Masonry Waterproofer 875.
b. Benjamin Moore: Ultra Spec Masonry.
c. Sika-UGL Drylok Extreme.
3. Epoxy Topcoat: Eggshell finish.
a. BEHR: US Coatings EpoxyGrip 2000 VOC Epoxy Mastic Coating.
b. Benjamin Moore: Corotech Surface Tolerant Epoxy Mastic V160.
c. PPG Paints: Amerlock 600.
d. Sherwin-Williams: Macropoxy 646-100.
e. Tnemec: Series N69 High Build Epoxoline II.

C. Gypsum Board Walls:
1. Latex Primer:
a. BEHR: Drywall Plus Interior Primer & Sealer 73.
b. Benjamin Moore: Ultra Spec 500 Interior Latex Primer N534.
c. PPG Paints: SPEEDHIDE zero Interior Latex Sealer 6-4900XI.
d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex Primer B28W02600.
e. Tnemec: Series 151 Elasto-Grip.
2. Acrylic Latex Enamel: Semigloss finish.
a. BEHR: Behr Pro i300 Interior.
b. Benjamin Moore: Ultra Spec 500 Series.
c. PPG Paints: SPEEDHIDE Zero Interior Latex.
d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.
e. Tnemec: Series 1029 Enduratone low semigloss.

D. Gypsum Board Ceilings:
1. Latex Primer:
a. BEHR: Drywall Plus Interior Primer & Sealer 73.
b. Benjamin Moore: Ultra Spec 500 Interior Latex Primer N534.
c. PPG Paints: SPEEDHIDE zero Interior Latex Sealer 6-4900XI.
d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex Primer B28W02600.
e. Tnemec: Series 151 Elasto-Grip.
2. Acrylic Latex Enamel: Eggshell finish.

a. BEHR: Behr Pro i300 Interior.
b. Benjamin Moore: Ultra Spec 500 Series.
c. PPG Paints: SPEEDHIDE Zero Interior Latex.
d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.
e. Tnemec: Series 1029 Enduratone low semigloss.

E. Overhead Construction:
1. Water Based Interior Dry Fog: Eggshell finish.
a. BEHR: Pro HPC Waterborne Dryfall HP210.
b. Benjamin Moore: Latex Dry Fall.
c. PPG Paints: Speedhide SuperTech Interior Latex Dry-Fog.
d. Sherwin-Williams: Pro Industrial Waterborne Acrylic Dryfall.
e. Tnemec: Series 115 UniBond DF.

END OF SECTION

SECTION 099323

INTERIOR STAINING AND FINISHING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finisheson the following interior substrates:
   1. Interior Substrates:
      a. Wood handrails and guardrail cap.

B. Related Requirements:
   1. Section 018113.13 "Sustainable Design Requirements – LEED Certification".
   2. Section 081416 "Flush Wood Doors" for prefinished door finishes.
   3. Section 099100 "Painting" for interior opaque finishes.
   4. Section 099600 "High-Performance Coatings" for high-performance coatings on interior and exterior metal and concrete surfaces.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include low-emitting materials for interior primers, stains, and transparent finishes, including printed statement of VOC content.

B. Samples for Initial Selection: For each type of product.
   1. Submit Samples on representative samples of actual wood substrates.
   2. Label each Sample for location and application area.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
   1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
   2. Apply coats on Samples in steps 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: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
      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 stain color selections will be based on mockups.
      a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations: Obtain each coating product from single source from single manufacturer.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co. as Basis-of-Design.
   2. Sherwin-Williams; Paint Stores Group.
   3. PPG Architectural Finishes, Inc.
   4. Pratt & Lambert.
   5. Or approved equal.

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in wood finish systems schedules for the product category indicated.

2.3 MATERIALS, GENERAL

A. Material Compatibility:
   1. Materials for use within each paint system shall be 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, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Stain Colors: Match Architect's samples or As selected from selected samples.

2.4 MISCELLANEOUS FINISHING PRODUCTS

A. Wood Fillers:
   1. Wood Filler Paste: MPI #91.

B. Sealers:
   1. Lacquer Sanding Sealer: MPI #84.

C. Interior Wood Primers:
   1. Alkyd Sanding Sealer, Solvent Based, Clear: Solvent-based, quick-drying, clear, sandable alkyd sealer used on new interior wood surfaces that are to be top-coated with an alkyd varnish.

2.5 INTERIOR WOOD STAINS:

A. Interior Wood Stain (Semitransparent): MPI #90.

B. Stain, Semitransparent, for Interior Wood: Solvent-based, oil or oil/alkyd, semitransparent, pigmented stain for new interior wood surfaces that are to be finished with a clear varnish.

2.6 TRANSPARENT FINISHES:

A. Polyurethane Finishes:
   1. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.
   2. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.

B. Varnish, Interior Polyurethane, Moisture Cured, Gloss: Solvent-based, moisture-curing polyurethane clear-coating with a gloss finish for interior wood surfaces.
   1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523.

2.7 SOURCE QUALITY CONTROL

A. Testing of Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If 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 wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

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.

B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Maximum Moisture Content of Interior Wood Substrates: 10 percent, when measured with an

electronic moisture meter.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with finish application only after unsatisfactory conditions have been corrected.
   1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
   1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer written instructions for each substrate condition and as specified.
   1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
   2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Interior Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
   3. Sand surfaces exposed to view and dust off.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer written instructions and recommendations in "MPI Architectural Painting Specification Manual."
   1. Use applicators and techniques suited for finish and substrate indicated.
   2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
   3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks,

runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage 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 finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Wood guardrail cap.
   1. Polyurethane Varnish over Stain System MPI INT 6.3E:
      a. Stain Coat: Stain, semitransparent, for interior wood, MPI #90.
      b. First Intermediate Coat: Polyurethane varnish matching topcoat.
      c. Second Intermediate Coat: Polyurethane varnish matching topcoat.
      d. Topcoat: Varnish, interior, polyurethane, oil modified, satin (MPI Gloss Level 4) MPI #57.

END OF SECTION

SECTION 099600

HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. High-performance coating for interior and exterior substrates.

B. Principal Products:
   1. High performance coating (HPC) systems on:
      a. Steel (non-galvanized) fabrications.
      b. Galvanized steel fabrications.
   2. Acrylic concrete floor coating (FS1).
   3. Preparation of surfaces for high performance coating and finishing.

C. Related Sections:
   1. Section 051200 - Structural Steel Framing for high-performance coatings.
   2. Section 055000 - Metal Fabrications: Shop priming for high-performance coatings.
   3. Section 099100 - Painting for interior walls, ceilings and hollow metal doors and frames.
   4. Section 099733 - Concrete Floor Sealer for interior exposed concrete floors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated. Submit Samples on actual substrate material to be coated, 8 inches square.

C. Product Schedule: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Materials (Attic Stock): 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. Provide 5 percent, but not less than 1 gal. of each material and color applied.

1.4 QUALITY ASSURANCE

A. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of total systems for various substrates.
   1. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

B. Approved Applicator: Applicator shall have not less than 3 years of successful experience in installation of similar coating systems and shall be certified in writing as manufacturer's licensed or approved applicator.

C. Owner reserves the right to have testing agency test materials used as often as deemed necessary during period when coatings are being applied to ensure that product materials being used comply with specified requirements.

D. Mockups: Apply mockups of each coating system indicated 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 coating system.
      a. Wall and Ceiling 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.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Environmental Requirements: Comply with Manufacturer's recommendations for environmental conditions under which coating and finishing can be applied.
   1. Do not apply finish in areas where dust is being generated.

B. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

C. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

D. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Single-Source Responsibility: Provide all system components produced by same manufacturer.

B. Compatibility: Provide materials that are compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer of coating system based on testing and field experience.
   1. For each system component, provide products recommended in writing by Manufacturer as compatible with other system components and recommended for application to substrate indicated.
   2. Products shall be of same manufacturer for each coat in a coating system.

C. Products and Manufacturers: Provide Basis of Design product or equivalent product as approved by Architect by one of the following manufacturers:
   1. ICI/Dulux.
   2. Pittsburg Paints.
   3. Sherwin Williams.
   4. Tnemec Company, Inc.

D. Colors (HPC): Provide high-performance coating type as specified in this Section, in color as indicated on the Material Identification List and matching corresponding paint color (PT).
   1. Mixing and Tinting: Deliver coating components ready-mixed to job site. Accomplish job mixing and job tinting only as approved by Manufacturer. Use tinting materials recommended by Manufacturer for specified system and application.
   2. Provide multiple finish coats as required to achieve desired color, matching Architect's sample.

2.2 COATINGS SCHEDULE

A. Steel (non-galvanized), Interior and Exterior:
   1. Basis of Design System: Consisting of products listed below by Tnemec Company, Inc.
   2. Surface Preparation: SSPC-SP10/NACE 2. Touch-up galvanized surfaces with high-zinc coating.
   3. Primer: Zinc-rich Urethane.
      a. Product: Series 94-H2O Hydro-Zinc.
      b. Dry Film Thickness: 2.5 to 3.5 mils.
   4. Intermediate (Build) Coat: Inorganic Water-Based Epoxy.
      a. Product: Series 1224 Epoxoline.

b. Dry Film Thickness: 4.0 to 6.0 mils.
5. Finish Coat: Liquid Fluoropolymer.
a. Product: Series 1070V (gloss) 1071V (semi-gloss) Fluoronar.
b. Dry Film Thickness: 2.0 to 3.0 mils.
6. Total System Dry Film Thickness: 8.5 to 12.5 mils.

B. Galvanized Steel, Interior and Exterior:
1. Basis of Design System: Consisting of products listed below by Tnemec Company, Inc.
2. Surface Preparation: Visible deposits of oil, grease, or other contaminants shall be removed as required by SSPC-SP1. Sweep (Abrasive) Blasting per SSPC-SP16 to achieve a uniform anchor profile (1.0 to 2.0 mils). Galvanized surfaces must be clean, dry, and contaminant free prior to application of coatings. Touch-up galvanized surfaces with high-zinc coating.
3. Use the manufacturer-recommended zinc-rich repair material at damaged galvanizing, welds, cuts, and exposed bare steel.
4. Intermediate (Build) Coat: Inorganic Water-Based Epoxy.
a. Product: Series 1224 Epoxoline self-primer over.
b. Dry Film Thickness: 4.0 to 6.0 mils.
5. Finish Coat: Liquid Fluoropolymer.
a. Product: Series 1070V (gloss) 1071V (semi-gloss) Fluoronar.
b. Dry Film Thickness: 2.0 to 3.0 mils.
6. Total System Dry Film Thickness: 8.5 to 12.5 mils.

C. Concrete Floors.
1. Primer: Not required.
2. Acrylic Floor Coating:, FS1 Satin finish.
a. Sherwin-Williams: Armorseal 8100 Water Based Epoxy, as Basis-of-Design.
b. BEHR: Premium Porch & Patio Floor Paint.
c. Benjamin Moore: Insl-X Sure Step.
d. PPG Paints; Break-Through! Water-borne Acrylic.
e. Sika-UGL Drylok.
f. Tnemec: Series 287 Enviropox.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive high performance coatings for conditions that would adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work.
1. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

B. Proceed with coating application only after unsatisfactory conditions have been corrected. Application of coating indicates acceptance of surfaces and conditions.

3.2 SURFACE PREPARATION

A. Perform preparation and cleaning procedures in accordance with coating manufacturer's instructions and as specified, for each particular substrate condition.

B. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

C. Clean substrates of substances that could impair bond of coatings, 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 coating systems indicated.
   2. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC- PA 1 for touching up shop-primed surfaces.

E. 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 coatings.

F. Architecturally Exposed Structural Steel: Smooth exposed surface and edges, including welds, by grinding and fill depressions, voids and holes with weld material and/or auto body filler, sand smooth, prime and coat.

G. Ferrous Metals: Clean non-galvanized, ferrous surfaces that have not been shop-coated of oil, grease, loose mill scale and other foreign substances by solvent or mechanical cleaning, complying with Steel Structures Painting Council (SSPC)-SP6.
   1. Touch-up shop-applied prime coats which have damaged or bare areas. Wire-brush, solvent clean, and touch-up with same primer as shop coat.
      a. Clean unprimed steel surfaces by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned.
      b. Prime surfaces to indicate defects. Coat after defects have been remedied.
      c. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous.
      d. Clean surfaces with solvent. Prime bare steel surfaces. (Prime steel including shop primed steels.).

3.3 APPLICATION

A. Apply high-performance coatings according to Manufacturer's written instructions and as follows:
   1. Use applicators and techniques suited for coating and substrate indicated.
   2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

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 coatings for dry film thickness.
1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 INSTALLED WORK

A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

D. Provide "Wet Paint" signs as required to protect newly coated finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of coating operations.

END OF SECTION

SECTION 099733

CONCRETE FLOOR SEALER

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Sealing interior concrete floors.

B. Principal Products:
   1. Concrete hardener, densifier, and sealer.

1.2 ACTION SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Accept concrete sealer on site in manufacturer's original unopened containers. Inspect for damage.

B. Protect concrete sealer from freezing.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not install concrete sealer when air temperature or concrete surface temperature is less than 40 degrees F.

B. Maintain concrete floor surface temperature above freezing during and after installation of concrete sealer until sealer is cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Concrete Floor Sealer: See Finish Legend on Drawings.
   1. Manufacturers and Products:

a. H&C ClariShield Solvent-Based Wet Look Clear Concrete Sealer; as basis of design.
b. Eagle Supreme Seal Premium Coat EU1 Concrete Sealer.
c. Armor LV25 Solvent Based High Closs Acrylic Cure and Seal.
d. Or approved equal.

2.2 MATERIALS & PRODUCT DESCRIPTION

A. Concrete Sealer, SC1: Liquid membrane-forming, clear, non-yellowing, xylene/solvent-based acrylic curing and sealing compound.

B. Performance Standards:
1. Concrete Curing: Complies with ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

C. Physical & Performance Properties:
1. Finish/Sheen: High-Sheen Gloss ("Wet Look" appearance that deepens underlying substrate color).
2. Resistances: Formulated to withstand heavy vehicular and foot traffic, UV degradation, water intrusion, deicing salts, oil, and mild chemical stains.
3. Volatile Organic Compounds (VOC): Less than 250 g/L (for Low-VOC/250 variant) or compliant with applicable regional environmental regulations.
4. Dry-to-Touch Time: 30 to 60 minutes at 77°F (25°C) and 50% relative humidity.
5. Recoat Time: Minimum 4 hours.
6. Full Cure / Traffic Ready: 72 hours for heavy vehicular traffic; full ultimate cure in 7 to 14 days.
7. Estimated Coverage Rate: 75 to 250 sq. ft. per gallon, varying dynamically based on surface texture and substrate porosity (e.g., porous concrete block, pavers, or smooth stamped concrete).

2.3 MIXES AND ACCESSORIES

A. Thinning: Do not thin or dilute; product is supplied ready-to-use.

B. Cleanup Solvent: Xylene.

C. Slip-Resistance Additive (Optional): Where slip resistance is required for pedestrian wet areas, incorporate manufacturer’s approved micronized polymeric aggregate (e.g., H&C SharkGrip) directly into the final topcoat mix prior to application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Substrate Assessment: Verify that concrete and masonry surfaces are structurally sound,

completely clean, and thoroughly dry.

B. Cure Time: Ensure new concrete substrates have fully cured for a minimum of 28 days prior to application (unless explicitly utilized as a fresh cure-and-seal under ASTM C309 conditions, which requires a minimum 72-hour wait time).

C. Moisture & pH Testing:
   1. Moisture Content: Test surfaces for moisture vapor transmission. Do not apply if moisture is actively migrating or if the substrate fails a standard plastic sheet test (ASTM D4263).
   2. Alkalinity: Test substrate pH. Ensure values fall strictly within the manufacturer's acceptable range of 6.0 to 10.0.

D. Environmental Constraints: Do not apply sealer if surface or ambient temperatures are below 50°F (10°C) or exceed 90°F (32°C). Do not apply if rain, heavy dew, or high humidity is forecasted within 24 hours.

3.2 PREPARATION

A. Cleaning: Remove all dirt, dust, oil, grease, laitance, efflorescence, curing compounds, and foreign matter. Use mechanical grinding, power washing, or approved chemical cleaners to achieve a completely clean, bare substrate.

B. Porosity & Profile: Verify the surface is absorbent and exhibits a texture profile similar to 120-grit sandpaper. Etch smooth or tight concrete surfaces using an appropriate acid or mechanical profiling method if needed to ensure penetration.

C. Drying: Allow the substrate to dry completely for a minimum of 24 hours after power washing or cleaning before applying the solvent-based sealer.

3.3 APPLICATION

A. Mixing: Thoroughly stir the product before and during use. Do not thin, dilute, or mechanically whip air into the sealer.

B. Application Methods: Apply product uniformly using a high-quality brush, synthetic solvent-resistant roller cover (3/8-inch to 1/2-inch nap depending on texture), or an airless sprayer.

C. Coat Requirements:
   1. Apply 2 to 3 uniform coats on bare concrete or pavers to achieve a consistent gloss appearance.
   2. Maintain a continuous wet edge to prevent lap marks and tracking.

D. Drying and Recoat Intervals: Allow the first coat to dry for a minimum of 4 hours before applying subsequent coats. Adjust drying times upward during colder or less ventilated conditions.

E. Slip-Resistant Texturing: Where slip resistance is designated for pedestrian walkways, uniformly broadcast and back-roll the manufacturer-approved micronized aggregate additive (H&C SharkGrip) into the final coat.

3.4 CLEANING AND PROTECTION

A. Equipment Maintenance: Clean all application tools, sprayers, and equipment immediately after use using xylene.

B. Traffic Restrictions: Protect the sealed surface from foot traffic for a minimum of 4 hours after final coat application. Restrict vehicular or heavy traffic for at least 72 hours to allow for initial hard-cure; avoid heavy chemical exposure for 7 to 14 days.

END OF SECTION

SECTION 101300

DIRECTORIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Directories at locations shown on Drawings.

B. Principal Products:
   1. Surface mounted directory.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Initial selection color charts.

B. Shop Drawings:
   1. <Submittal requirement>

C. Schedules:

D. Samples:
   1. Finishes: 2 by 3 inches in size.

PART 2 PRODUCTS

2.1 DIRECTORIES

A. Directories: Signage with interchangeable suite names and numbers.
   1. Manufacturers:
      a. APCO Graphics.
      b. ASI Sign Systems.
      c. Best Signs.
      d. H. Toji & Company.

e. Mohawk Sign Systems.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 101400

SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Interior room signs identifying each permanent room or space.
   2. Code required signs.
   3. Building ID address numerals.

B. Principal Products:
   1. Panel signs.
   2. Dimensional numerals.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate locations of concealed blocking and support framing in walls.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

C. Sequencing Procedures:
   1. Install room signs after doors and wall surfaces are finished.

1.3 ACTION SUBMITTALS

A. Product Data: Material, finishes for each type of sign.
   1. Initial Selection: Sign styles, color charts, and character styles and colors.

B. Shop Drawings: Sign styles, lettering font, foreground and background colors, overall dimensions of each sign.
   1. Electronic Signage: Include wiring diagrams, electrical and data connection types and locations, structural supports, and section of enclosure cabinet.
   2. Vinyl Graphics: Include dimensioned elevations including all wall mounted items, with pantone numbers for each color labeled on image.

C. Schedule: Locations of each sign type, description of graphics, and message text.

D. Samples:
   1. Full size, each sign type. Approved Samples may be incorporated into Work.
   2. Finishes: 2 by 3 inches in size.
   3. Vinyl Graphics: 3 by 3 feet in size.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Manufacturer recommended parts and quantities.
   1. Changeable Slide Strips: Two per sign.

B. Tools: Manufacturer recommended special tools required to maintain <Product>.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer approved.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package signs labeled in name groups.

B. Store adhesive attachment tape at ambient room temperatures.

1.8 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Precipitation: None occurring and none predicted within 24 hours.
   3. Establish ambient conditions 8 hours, minimum before installation[and maintain conditions during and after installation].

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer Warranty:
   1. Signs: Warrant against product failure.
      a. Failure includes loss of adhesion, fading, clouding, and yellowing.
      b. Warranty Period: 5 years.
   2. Vinyl Graphics: Warrant against product failure, manufacturing defects, excessive dimensional change and loss of adhesion.
      a. Warranty Period: 5 years.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: Ten years.

PART 2 PRODUCTS

2.1 ROOM IDENTIFICATION SIGNS

A. Room Identification Signs: Raised character acrylic signs.
   1. Manufacturers:
      a. 2/90 Sign Systems.
      b. Ace Sign Systems.
      c. APCO Graphics.
      d. ARK Ramos Signage Systems.
      e. ASI Sign Systems.
      f. Best Signs.
      g. Gemini.
      h. Green Dot Sign.
      i. H. Toji & Company.
      j. Mohawk Sign Systems.
      k. Takeform.
   2. Total Thickness: 1/8 inch.
   3. Sizes, Shapes: See Drawings.
   4. Corners: Square.
   5. Character Style: Architect selected ADA compliant characters.
   6. Braille: 1/32 inch, minimum, integral raised characters.
   7. Colors: Architect selected.
   8. Graphics: Owner will supply electronic files and color requirements for sign graphics.
   9. Mounting: Double side foam-core adhesive tape.

2.2 DIMENSIONAL NUMERALS

A. Dimensional Letter Signage: Bronze, cast characters.
   1. Manufacturers:
      a. 2/90 Sign Systems.
      b. Ace Sign Systems.
      c. Allen Industries.
      d. APCO Graphics.
      e. ARK Ramos Signage Systems.
      f. ASI Sign Systems.
      g. Best Signs.
      h. Gemini.
      i. H. Toji & Company.
      j. Stewart Signs.
      k. Takeform.
      l. Or approved equal.
   2. Sizes: See Drawings.
   3. Character Style: Architect selected from County standard for Buiding ID..
   4. Colors: Architect selected.
   5. Mounting: Exposed metal fasteners, anchored to wall.
      a. Mounting Height: See Drawings.

2.3 PERFORMANCE

A. Surface Burning: ASTM E84 Class A.
   1. Flame Spread Index: 25, maximum.
   2. Smoke Developed Index: 450, maximum.

B. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

C. Environmental Performance:
   1. Expansion and Contraction: Withstand 120 degree F ambient and 180 degree F surface thermal cycling without failure.

2.4 MATERIALS

A. Acrylic Sheet: ASTM D4802, manufacturer standard, UV filtering.

B. Steel Sheet: ASTM A653, Grade 33 Structural Quality, G60 galvanizing.

C. High Pressure Decorative Laminate: ISO 4586-3.

D. Steel Welding Materials: AWS D1.1, types as required for materials being welded.

E. Adhesives: Recommended by signage manufacturer, VOC compliant.

F. Adhesive Tape: Double-sided, zero VOC.

G. Fasteners: Type, size, and material to suit each application.
   1. Exterior: Hot-dip galvanized.

2.5 FABRICATION

A. Make graphics corrections for color and size. Provide a proof for Architect confirmation prior to printing.

B. Factory assemble panel signs.

C. Assemble electronic signage enclosures with internal mounting brackets for anchor bolt attachment.

2.6 FINISHES

A. Anodizing: AAMA 611 Class I or AAMA 612 with electro-deposition organic seal.
   1. Color:.

B. Metallic Coated Steel Sheet Coil-Coatings: ASTM A755; Two coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color coat.
   1. Pencil Hardness, ASTM D3363: HB - H.
   2. Salt Spray Resistance, ASTM G85: 1,000 hours, minimum.
   3. Humidity Resistance, ASTM D2247: 1,000 hours, minimum.
   4. Color and Gloss: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrates are ready to receive Work.

B. Verify mounting structure is ready for signage and can support the equipment weight.

C. Verify conduit and junction box placement matches shop drawings.

3.2 PREPARATION

A. Clean substrates for adhesive mounting per manufacturer recommendations.

B. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings before application of vinyl graphics.

C. Perform adhesion testing recommended by vinyl graphics film manufacturer.

3.3 INSTALLATION

A. Follow accessibility requirements.

B. Sign Locations: See Drawings.
   1. Locate room identification signs on wall surfaces adjacent to strike side of door, 5 feet above finished floor to center line of sign and 3 inches from door jamb trim.
   2. Locate informational signs on wall surfaces, 5 feet above finished floor to center line of sign at scheduled locations.

C. Install signs plumb and level.

D. Install signs to lay flat against wall.

E. Adhere sign to substrate with adhesive tape.

F. Mount dimensional letters to wall with stainless steel bolts.

G. Place concrete footing for sign posts per Drawings. Fasten sign to post with stainless steel bolts.

H. Route power and control cables to electronic signage in conduit.

I. Position and apply vinyl graphics as recommended by manufacturer. Install smooth, with no gaps, overlaps, wrinkles, bubbles, or creases.

3.4 CLEANING

A. Clean signage of excess adhesive, dust, and other contaminants.

B. Reinstall wall plates and accessories removed before Work of this section.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 CLOSEOUT ACTIVITIES

A. Engage factory authorized representative to train Owner personnel to program, adjust, operate, and maintain electronic signage.

END OF SECTION

SECTION 102113.17

PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Phenolic-core toilet compartments (TP1).

1.2 COORDINATION

A. Coordinate requirements forblocking, reinforcing, and other supports concealed within wall to ensure that toilet compartments can be supported and installed as shown.

1.3 ACTION SUBMITTALS

A. Product Data.
   1. Phenolic-core toilet compartments.
      a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachment details.
   2. Show locations of cutouts for compartment-mounted toilet accessories.
   3. Show locations of centerlines of toilet fixtures.
   4. Show locations of floor drains.

C. Samples for Initial Selection: Manufacturer standard color sheets, showing full range of available colors for each type of toilet compartment.
   1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: Actual sample of finished products for each type of toilet compartment, hardware, and accessory.
   1. Size: Manufacturers' standard size.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

F. Delegated Design Submittals: For grab bars mounted on toilet compartment panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For toilet compartments.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Door Hinges: One hinge(s) with associated fasteners.
   2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
   3. Door Bumper: One door bumper(s) with associated fasteners.
   4. Door Pull: One door pull(s) with associated fasteners.
   5. Fasteners: 10 fasteners of each size and type.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain phenolic-core toilet compartments from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Recycled Content: Provide compartments with 60 percent recycled content; provide steel components with minimum 25 percent post-consumer recycled content.

B. 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: 25 or less.
   2. Smoke-Developed Index: 450 or less.

C. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:
   1. Panels are able to withstand a concentrated load on grab bar of at least 250 lbf (1112 N) applied at any direction and at any point, without deformation of panel.

D. Regulatory Requirements: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 for toilet compartments designated as accessible.

2.3 PHENOLIC-CORE TOILET COMPARTMENTS

A. Phenolic.Core Toilet Compartment: A high-pressure solid phenolic core with standard black edges type.
   1. Manufacturers and Products:
      a. ASI Global Partitions, Black core Phenolic, as Basis-of-Design.
      b. Bradley Corporation.
      c. Bobrick.
      d. AAMCO, All American Metal Corporation.
      e. Or approved equal.

B. Toilet-Enclosure Style: Ceiling hung.
   1. Pilasters suspend directly from structural steel ceiling supports to leave the floor surface completely unobstructed for maintenance.

C. Materials and Construction:
   1. Core Material: Solid phenolic core consisting of multiple layers of resin-impregnated kraft paper fused under high heat and pressure. The panel is completely impervious to moisture, steam, and corrosion.
   2. Surface Finish: Decorative melamine surface sheet on both sides.
   3. Color Selection: Charcoal 3077.
   4. Edges: Machine-sanded with a 45-degree radius edge. Edges feature a distinct black core color finish.
   5. Fire-Resistance Rating: Class B standard (Class A optional).

D. Component Thicknesses:
   1. Doors: 3/4 inch.
   2. Pilasters: 3/4 inch.
   3. Panels and Screens: 1/2 inch.

E. Privacy Level: Standard Privacy layout.
   1. Door & Panel Height: 58 inches.
   2. Clearance: Components are mounted 12 inches (305 mm) above the finished floor surface.

F. Urinal-Screen Construction: Matching panel construction.

2.4 HARDWARE AND COMPONENTS

A. Door Hinges: Heavy-duty, rugged Stainless Steel Vault Hinges. Hinges feature a wrap-around design for maximum strength in heavy-duty commercial environments. Through-bolted to doors and pilasters with three-point bearing functionality operating inside low-friction nylon bushings.

B. Wall and Pilaster Brackets: Heavy-duty Type 304 stainless steel stirrup brackets (or optional continuous brackets) matching the vault hinge finish.

C. Latch, Keeper, and Accessories:
   1. Latch Mechanism: Stainless steel surface-mounted slide latch with emergency access compliance.
   2. Indicator: Latch assembly integrated with an exterior occupancy indicator.
   3. Coat Hook & Bumper: Combination heavy-duty stainless steel hook and rubber bumper projection.
   4. Door Pulls: Stainless steel pulls on all designated accessible/ADA stall doors.

D. Ceiling Anchoring & Trim Shoes:
   1. Trim Shoes: One-piece Type 304 stainless steel construction with a #4 satin finish.
   2. Anchoring: Shoes are hemmed top and bottom to seamlessly conceal the structural overhead anchoring hardware.

E. Fasteners: All exposed hardware secured with high-security, vandal-resistant stainless steel Torx-pin fasteners.

2.5 MATERIALS

A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

B. Stainless Steel Castings: ASTM A743/A743M.

2.6 FABRICATION

A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Floor-Anchored Units: Manufacturer standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, inswinging doors for standard toilet enclosures and 36-inch- (914-mm-) wide, outswinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for toilet enclosures designated as accessible.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
   1. Confirm location and adequacy of blocking and supports required for installation.

B. Inspect Overhead Support: Verify that the concrete plank mezzanine floor structural attachment points are properly located and securely installed.

C. Assess Concrete Substrate: Verify thickness, compressive strength, and location of prestressed tendons in the concrete plank mezzanine to avoid damage during drilling.

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

3.2 PREPARATION

A. Layout Layouts: Establish centerline dimensions and plumbing fixture locations before installing anchoring devices.

B. Verify Clearance: Check vertical dimensions to ensure standard privacy heights meet specified floor-to-ceiling clearances.

3.3 INSTALLATION

A. General: Comply with manufacturer written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer recommended anchoring devices.

B. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
   1. Overhead Anchoring: Secure structural ceiling-hung members directly to the concrete plank mezzanine floor using heavy-duty stainless steel expansion anchors torque-tested to engineer-approved specifications.
   2. Drilling Parameters: Drill anchor holes using carbide-tipped bits to the exact diameter and depth recommended by the anchor manufacturer, ensuring holes are thoroughly cleaned of debris prior to setting.
   3. Pilaster Mounting: Fasten pilasters securely to the overhead structural support mechanism, adjusting leveling devices to achieve uniform alignment.
   4. Wall Brackets: Attach stainless steel wall brackets using structural fasteners matching the wall construction type.
   5. Panel Assembly: Secure panels to wall brackets and pilasters using theft-resistant, stainless steel fasteners.

6. Clearances: Maintain standard privacy clearances with a maximum 1/2-inch gap between panels and walls.
7. Hardware Attachment: Install stainless steel vault hinges, latches, bumpers, and coat hooks in accordance with manufacturer specifications.
8. Privacy Alignment: Adjust standard privacy overlapping components to ensure zero line-of-sight gaps when doors are closed.

3.4 ADJUSTING

A. Hinges: Adjust stainless steel vault hinges to allow standard closed positioning or a uniform partial-open setting when unoccupied.

B. Latches: Adjust door latches and keeps to operate smoothly without binding or requiring excessive force.

3.5 CLEANING AND PROTECTION

A. Clean Components: Remove protective masking and clean all phenolic surfaces and stainless steel hardware using non-abrasive, manufacturer-approved cleaners.

B. Final Inspection: Replace any damaged, scratched, or defective components prior to substantial completion.

END OF SECTION

SECTION 102600

WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Corner guard wall protection.
   2. Custom graphics wall protection.

B. Principal Products.
   1. Stainless steel corner guards (CG1).
   2. Rigid PETG shield wall protection with embedded graphic media (WP1).

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate installation of wall mounted products with concealed blocking and anchors.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Show physical dimensions, features, anchorage details, and rough-in measurements.

B. Shop Drawings:
   1. Show locations, extent, details, and attachments to other Work.

C. Samples:
   1. Linear Corner Guards: Full sized sections, 12 inches long.
   2. Sheet Wall Protection: Graphic section sized 8 by 10 inches.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wall and door protection, describing cleaning and repair procedures.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Corner Guard Covers: Full length stainless steel covers, 2 percent of installed materials; 2 units minimum.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Trained and approved by manufacturer.

B. Field Samples: Install sheet wall protection, 96 inches minimum length. Demonstrate texture, color, or pattern.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Temperature: Maintain 70 degrees F for 72 hours, minimum, before installation.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Impact Resistant Wall Units: Warrant against product failure.
      a. Failure includes structural failures, deterioration of plastic and other material under normal use.
      b. Warranty Period: Lifetime.

PART 2 PRODUCTS

2.1 CORNER GUARDS

A. Surface Mounted Stainless Steel Corner Guards, CG1:
   1. Manufacturers and Products:
      a. InPro Corporation, surface mounted stainless steel, as Basis-of- Design.
      b. Construction Specialties, Inc.
      c. Korogard.
   2. Configuration: See Drawings.
   3. Configuration:
      a. Leg Length: 2-1/2 inches.

b. Installation: Adhesive.
4. Stainless Steel Finish: #4.

2.2 WALL PROTECTION

A. Sheet Wall Protection, WP-1: Rigid shield sheet, impact-resistant, PVC-free, PETG-modified poymer adhesive mounted.
1. Manufacturers and Products:
a. Construction Specialties, Inc, Acrovyn 4000 by Design Wall Covering, as basis of design.
2. Substitutions: Not permitted.
3. Materials:
a. Formulated free of poly-vinyl chloride (PVC), bisphenol A (BPA), polybrominated diphenyl ethers (PBDEs), and halogenated fire retardants.
b. Nominal Sheet Thickness: 0.040-inch .
c. Surface Texture: Suede.
4. Custom graphics wall protection system:
a. Embedded Graphic Media: High-resolution digital imagery, patterns, or artwork printed directly to the reverse side (sub-surface) of the transparent rigid PETG shielding sheet.
1) Graphics shall be fully sealed, isolated, and protected from surface impacts, abrasions, and chemical cleaners by the front-facing protective layer.
2) Graphic Selection: [Custom Graphics] / [Acrovyn by Design Pattern Collection] as selected by the Architect.
b. Performance Attributes:
1) Flame-Spread and Smoke Evaluation: Class A/1 fire-rated and UL classified when tested in accordance with ASTM E84 / UL 723 standards.
2) Impact Resistance: Minimal shattering or deformation upon high-capacity impact.
3) Chemical and Stain Resistance: Unaffected by frequent commercial disinfectants and chemical cleaners when evaluated under ASTM D543.
5. Height: See Drawings.
6. Accessories:
a. Adhesives and Primers: Provide manufacturer-approved water-based mastic adhesive and low-VOC substrate primers recommended for 100% surface bond coverage.
b. Moldings and Joint Treatments: Provide color-matched vertical trims, inside/outside corners, and top edge caps, or color-matched sealer compounds as supplied by Construction Specialties, Inc. to ensure full system compliance.

2.3 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.4 MATERIALS

A. Adhesives: Manufacturer recommended products.
   1. VOC Content: 50 g/L, maximum.

B. Stainless Steel Sheet: ASTM A240/A240M.

C. Fasteners: Type, size, and material to suit each application.

2.5 FABRICATION

A. General: Factory assemble components to greatest extent possible to minimize field assembly.

B. Fabricate components with tight joints, corners and seams.

2.6 FINISHES

A. Protect metal finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Stainless Steel: 4.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify wall conditions follow manufacturer recommendations.

3.2 INSTALLATION

A. Install wall and door protection plumb and level.

B. Mounting Height from Finished Floor:
   1. Corner Guards: Top of base to 48 inches.

C. Sheet Wall Protection: Adhere to walls. Make seams uniform and hairline. Align exposed edges.

3.3 CLEANING

A. Clean Work after installation. Remove excess adhesive.

END OF SECTION

SECTION 102800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Toilet accessories.

B. Principal Products:
   1. Public use toilet room accessories.
   2. Shower room accessories.
   3. Custodial accessories.
   4. Installation of owner-furnished items.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate size and location of wall backing and toilet partition reinforcement for support of accessories.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Each accessory type.
   2. Powered Accessories: Submit electrical characteristics.
   3. Initial selection color charts and Samples.

B. Schedules: List product types, quantities, sizes, and installation locations. Use room numbers and accessory numbers in schedule.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric powered accessories.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Manufacturer recommended parts and quantities.

1.6 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 ACCESSORIES - GENERAL

A. Manufacturers and Products: See Toilet Accessory Schedule on Drawings.

2.2 SHOWER ROOM ACCESSORIES

A. Shower Robe Hooks:
   1. Material and Finish:.

B. Shower Grab Bars:
   1. Mounting: Flanges with concealed fasteners.
   2. Material and Finish: 4 Stainless steel, slip-resistant texture.
   3. Configuration and Length:.
   4. Diameter: 1-1/2 inches.

2.3 CUSTODIAL ACCESSORIES

A. Mop and Broom Holders: Units with hooks, mop clips, and shelf.
   1. Manufacturers and Products:
      a. Bobrick B-239x34, as basis of design.
   2. Length: 34 inches.
   3. Mop and Broom Holders: Four, spring loaded, rubber hat, cam type.
   4. Material and Finish: 4 Stainless steel.

B. Utility Shelves:
   1. Size: 24 inches long by 6 inches deep.
   2. Material and Finish: 4 Stainless steel.

2.4 PERFORMANCE

A. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.5 MATERIALS

A. Stainless Steel Sheet: ASTM A480, Type 304, 0.031 inch minimum nominal thickness.

B. Steel Sheet: ASTM A1008/A1008M, Designation CS; cold rolled, commercial steel, 0.036 inch minimum nominal thickness.

C. Galvanized Steel Sheet: ASTM A653/A653M, G60 hot dip zinc coating.

D. Galvanized Steel Mounting Devices: ASTM A153/A153M, hot dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices, same material as accessory.
   1. Exposed Fasteners: Tamper resistant.

F. Keys: Provide for locked accessories.
   1. Quantity: 3, minimum.

G. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.6 FABRICATION

A. Accessories, General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate sheet metal of seamless sheets with flat surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify backing supports are in place and adequate.

B. Powered Accessories: Verify electrical power is correctly located and is of proper characteristics.

3.2 INSTALLATION

A. Install accessories level, plumb, and firmly anchored.

B. Install using fasteners appropriate to substrate.

C. Grab Bars: Install to withstand 250 lbf minimum load, when tested per ASTM F446.

D. Powered Accessories: See Division 26 for wiring requirements.

E. Battery Powered Accessories: Install fresh batteries before Substantial Completion.

3.3 CLEANING AND PROTECTION

A. Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

B. Touchup, repair or replace damaged products until Substantial Completion.

END OF SECTION

SECTION 102819

TUB AND SHOWER ENCLOSURES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Shower enclosures at ADMIN and MAINTENANCE Locker Rooms.

B. Principal Products:
1. Cultured marble shower wall panels and matching trim and accessory components (SW1).
2. Cultured marble transfer shower pans (SB1).
3. Cultured marble ADA/accessible roll-in shower pans with integrated ramps (SB2).

C. Related Requirements:
1. Division 07 Section "Joint Sealants" for perimeter caulking and dynamic sealants.
2. Division 09 Section "Non-Structural Metal Framing" for 3-5/8 inch interior metal stud backup walls and wall blocking.
3. Division 09 Section "Gypsum Board" for 5/8 inch water-resistant gypsum backing board.
4. Division 10 Section "Toilet, Bath, and Laundry Accessories" for grab bars.
5. Division 22 Section "Plumbing Piping" and "Plumbing Fixtures" for floor drains, waste piping, and shower valves.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI Z124.1.2 - Plastic Bathtub and Shower Units.

B. International Association of Plumbing and Mechanical Officials (IAPMO):
1. Uniform Plumbing Code (UPC) compliance certification.

C. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate Work of this Section with installation of grab bars and connections to shower valves, floor drains and waste piping.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer’s technical data sheets, material profiles, verified dimensions, and installation guides for each type of component requested.

B. Shop Drawings:
   1. Provide layout drawings illustrating accurate dimensions, structural backup attachments, framing tolerances, drain centerlines, perimeter joints, trim placements, and details at intersections with gypsum board. Include locations of grab bar penetrations and plumbing fixtures.

C. Samples:
   1. One 6-by-6-inch sample of cultured marble wall panel illustrating the "Bright White" color, smooth finish, and 6-by-12-inch staggered tile pattern.
   2. One sample of the matching 2-by-3/4-inch trim strip.
   3. Color sample matching the specified textured, non-slip floor surface of the shower pans.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm specializing in manufacturing products specified in this section with a documented history of successful commercial installations.

B. Source Limitations: Obtain all cultured marble shower wall panels, shower pans, and associated cast stone accessories from a single commercial manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store glass indoors, protected from elements and secured from theft.

1.7 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

B. Maintain environmental conditions (temperature and humidity) within limits recommended by manufacturer. Do not install units until building envelope is enclosed and HVAC system is operational.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace cultured marble components that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, structural cracking, surface crazing, severe discoloration, bubbling, or delamination under normal commercial use.
   2. Warranty Period: Ten (10) year limited warranty from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SHOWER SURROUNDS

A. Shower Surrounds: Cast marble type.
   1. Manufacturers and Products:
      a. MPL Company (an An American Bath Group Brand); Smooth Style Pattern, as Basis-of-Design.
      b. Inpro.
      c. Kohler.
      d. Mincey Marble.
      e. Or approved equal.
   2. Material: Commercial-grade cast engineered stone (cultured marble), non-porous, antimicrobial, resistant to mold, mildew, and common commercial cleaning agents.
   3. Size: 96 inch high wall panels by full enclosure width and depth, configured to minimize field joints.
   4. Color: Manufacturer standard "Bright White".
   5. Texture: Smooth finish molded wth 6-by-12-inch staggered "Tile" pattern.
   6. Accessories:
      a. Trim Strips: Matching cultured marble material, 2 inches wide by 3/4 inch thick profile, supplied by the panel manufacturer for all top and exposed vertical side edges.
      b. Accessories: Provide one surface-mounted molded cultured marble 7-by-7-inch shampoo shelf per shower unit, color to match wall panels.

2.2 SHOWER PANS / RECEPTORS

A. Transfer Shower Pan, SB1: Cast marble type.
   1. Manufacturers and Products:
      a. MPL Company (an An American Bath Group Brand); Transfer model, as Basis-of-Design.
      b. Inpro.
      c. Kohler.
      d. Mincey Marble.
   2. Construction: Seamless, molded cultured marble with factory-applied fiberglass tiling flange integrated at back and side edges.
   3. Size: 36 inches wide by 36 inches deep (square).

4. Color: Manufacturer standard "Bright White".
5. Floor Finish: Molded, textured non-slip surface.
6. Drain Configuration: Center drain location.
7. Front Threshold Profile: Finished front edge featuring a slight molded curve curving down in the center.

B. Roll-in Shower Pan with Ramp, SB2: Cast marble type.
1. Manufacturers and Products:
   a. MPL Company (an An American Bath Group Brand); "RISP" model series, as Basis-of-Design.
   b. Inpro.
   c. Kohler.
   d. Mincey Marble.
2. Construction: Seamless, molded cultured marble with factory-applied fiberglass tiling flange integrated at back and side edges.
3. Size: 36 inches wide by 71 inches deep (square).
4. Color: Manufacturer standard "Bright White".
5. Floor Finish: Molded, textured non-slip surface.
6. Drain Configuration: Center drain location.
7. Accessibility Profile: Integrated entry threshold configured with an attached or monolithic 12-inch long ramp measuring 1-3/8 inches high at the front edge of the pan to allow flush or low-profile transition.

2.3 COORDINATION & SYSTEM ACCESSORIES

A. Plumbing Drain Coordination: Shower pans shall be manufactured with a standard 3-1/4 inch diameter center drain opening. The plumbing contractor shall furnish and install a commercial-grade drain assembly (e.g., matching brass or heavy-duty PVC body with a stainless steel strainer grid) designed to fit the 3-1/4 inch opening and compatible with the waste piping system specified in Division 22.

B. Grab Bar Hardware Penetration Components: Fasteners for grab bars shall consist of stainless steel threaded machine screws passing entirely through the cultured marble panel and gypsum board, anchoring securely into the internal structural metal wall blocking. Provide solid, moisture-resistant spacers (such as thick neoprene or solid plastic washers) between the structural framing and the back of the panel at penetration points to prevent cracking or deflection of the cultured marble when hardware is tightened.

2.4 INSTALLATION MATERIALS

A. Panel Adhesive: Premium 100% silicone adhesive or polyurethane construction adhesive as recommended by the cultured marble manufacturer, non-staining and low-VOC.

B. Joint Sealant: High-performance, 100% silicone sealant formulated with an antimicrobial agent to resist mold and mildew growth, color matched to "Bright White" panels.

2.5 PERFORMANCE

A. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate walls composed of 3-5/8 inch metal studs and 5/8 inch water-resistant gypsum board. Verify framing is square, plumb, and within a maximum tolerance of 1/8 inch in 8 feet.

B. Verify blocking is provided in wall construction to support doors and enclosures.

C. Verify that concrete slab-on-grade substrates are level, clean, dry, and free of defects that would affect the structural bedding of the shower pans.

D. Verify plumbing waste pipes and drains are accurately centered and set at the proper elevation relative to the finished concrete slab.

E. Verify that solid, continuous horizontal wall blocking has been installed within the 3-5/8 inch metal stud walls by the Contractor at all heights required for grab bar anchoring, prior to the installation of the 5/8 inch gypsum backing board and cultured marble wall panels. Do not proceed with panel installation if internal wall blocking is missing or misaligned.

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

3.2 PREPARATION

A. Clean substrates; remove projections, fill voids, and seal joints.

3.3 INSTALLATION OF SHOWER PANS (SB1 & SB2)

A. Clean the concrete floor surface of all dust, debris, and contaminants.

B. Conduct a dry fit of the shower pan to verify alignment with the rough floor drain pipe and wall framing.

C. Prepare and apply a structural bedding material (such as a thin-set mortar or alternative compound approved by the manufacturer) across the concrete slab footprint to ensure total, void-free support under the pan.

D. Set the shower pan firmly into the bedding compound. Level the unit in both directions along the top edges, verifying that the built-in floor slope drains completely toward the center outlet.

E. Secure the integrated fiberglass tiling flanges directly to the 3-5/8 inch metal stud framing using fasteners recommended by the manufacturer. Do not puncture or damage the visible cultured marble surfaces.

F. Coordinate the final setting of the shower pan with the plumbing contractor to ensure the 3-1/4 inch center drain opening aligns flawlessly with the rough-in plumbing waste riser. Install the compression or solvent-weld drain assembly to form a verified, permanent watertight seal between the pan's underside and the building drain system before finalizing wall panel installation.

3.4 INSTALLATION OF WALL PANELS AND TRIM (SW1)

A. Thoroughly clean the reverse side of the cultured marble panels and the face of the 5/8 inch gypsum backing board.

B. Apply panel adhesive to the back of the wall panels in a continuous grid or bead pattern in strict compliance with the manufacturer's instructions.

C. Press the back panel firmly against the wall substrate, ensuring complete adhesive transfer and a flat, uniform surface. Install side panels sequentially, maintaining a uniform joint width at corner intersections.

D. Adhere the 2-by-3/4-inch trim strips to all exposed top and vertical side edges of the panels to provide a clean, finished border.

E. Install the 7-by-7-inch shampoo shelf at the location and height detailed on the architectural drawings using structural silicone adhesive. Secure with temporary tape until cured.

3.5 GRAB BAR AND HARDWARE PENETRATIONS

A. Locate structural internal wall blocking positions precisely prior to drilling.

B. Drill pilot holes through the cultured marble wall panels from the finished side using sharp, carbide-tipped or diamond-grit hole saws or drill bits. Drill bits must be sized 1/16 inch larger than the fastener diameter to allow for subtle thermal expansion and contraction without binding. Do not use impact or hammer-drill functions on cultured marble surfaces.

C. Ensure solid, non-compressible spacer components are placed behind the panel at each mounting point to bridge any physical gaps between the panel back and the internal structural wall framing.

D. Apply a liberal bead of mildew-resistant 100% silicone sealant into and around the drilled hole prior to inserting fasteners.

E. Mount grab bar flanges firmly over the penetrations. Tighten fasteners securely to the structural wall blocking, ensuring a rigid, code-compliant assembly without over-tightening or subjecting the cultured marble panel to compressive cracking stresses. Wipe away any

displaced excess sealant immediately.

3.6 JOINT SEALING AND CLEANING

A. Tool all exposed perimeter joints, corner transitions, and trim edges with color-matched, mildew-resistant 100% silicone sealant to form a completely watertight assembly.

B. Remove excess adhesive, sealant, and temporary bracing. Clean all surfaces with clean water and mild, non-abrasive liquid detergents recommended by the cultured marble manufacturer.

3.7 PROTECTION

A. Provide protective coverings over the installed shower pans and wall panels to prevent damage, scratching, or staining from ongoing construction activities.

B. Maintain protection until Substantial Completion.

END OF SECTION

SECTION 104400

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Fire protection specialties.

B. Principal Products:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate work of this Section with adjacent work.

B. Preinstallation Meeting:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Extinguisher operational features.
   2. Initial selection color Samples.

B. Shop Drawings:
   1. Show cabinet dimensions, details, fire ratings, and wall bracket mounting.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Deliver fire protection specialties in manufacturer undamaged packaging.

1.6 WARRANTY

A. Manufacturer Warranty:
   1. Fire Extinguishers: Warrant against product failure.
      a. Failure includes material and workmanship.
      b. Warranty Period: 5 years.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Multipurpose Dry Chemical:
   1. Manufacturers and Products:
      a. Amerex Model B441.
      b. Babcock-Davis BEX-3010.
      c. J.L. Industries Cosmic 10E.
      d. Larsen's Manufacturing MP10.
      e. Nystrom EX-3010.
      f. Potter Roemer 3010.
   2. UL Rating: 4A:80-B:C.
   3. Nominal Capacity: 10 pounds.
   4. Container: Enameled steel container with chrome plated brass valve.

2.2 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction:
   1. Nonrated.
   2. 1 hour fire rated.
   3. 2 hour fire rated.

B. Flush Door Concealed Hinge Fire Extinguisher Cabinets:
   1. Manufacturers and Products:
      a. Activar Inc. J.L. Industries Clear VU 1535.
      b. Babcock-Davis Vanguard Series BFC-72.
      c. Larsen's Manufacturing Occult Series.
      d. J.L. Industries Embassy Series.
      e. Nystrom Summit Series FC-72.
      f. Potter-Roemer Dana Series.
      g. Safety One Industries Sonoma Series.
   2. Cabinet: Cold rolled steel, sized for extinguisher; fully recessed.
      a. Interior Finish: White baked enamel.
   3. Door: Stainless steel, No. 4 finish.
   4. Hardware: Piano hinge and door pull.
   5. Glazing: Full.
   6. Glass Type: Acrylic.
      a. Glass Color: Clear.

2.3 PERFORMANCE

A. Fire Resistance:
   1. Fire Rated Extinguisher Cabinets: ASTM E814; match rating of walls where installed.

2.4 MATERIALS

A. Steel Sheet: Cold rolled steel, ASTM A1008.

B. Aluminum Extrusions: ASTM B221.

C. Aluminum Sheet: ASTM B209, manufacturer recommended alloy and temper.

D. Stainless Steel: ASTM A666, Type 304.

2.5 FABRICATION

A. Shop Fabrication: Provide cabinets with trim, frame, door, and hardware.

2.6 FINISHES

A. Shop Finishing Methods: Follow NAAMM AMP 500.

2.7 ACCESSORIES

A. Mounting Brackets: Steel, red enamel finish, sized for specified fire extinguishers.

B. Fire Blankets: Fire retardant treated fabric; red color, 62 by 84 inch size.

C. Cabinet Signs: Cabinet face applied.
   1. Lettering: Stenciled.
      a. Legend: "FIRE EXTINGUISHER."
   2. Arrangement: See Drawings.
   3. Color: Red.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough openings and blocking for cabinets are correctly sized and located.

3.2 INSTALLATION - GENERAL

A. General: NFPA 10.

B. Secure cabinets in place.

C. Place extinguishers and fire blankets in cabinets and on wall brackets.

D. Apply signage.

3.3 ADJUSTING

A. Adjust fire protection cabinet doors for smooth operation.

3.4 CLEANING

A. Clean interior and exterior surfaces.

END OF SECTION

SECTION 105100

LOCKERS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Half-height lockers at Admin Building and Transfer Center.

B. Principal Products:
   1. Metal Lockers.
      a. Admin Building, Locker Rooms (002).
      b. Transfer Center, Break Room (007).

C. Section Includes:

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. HDPE: High-density polyethylene.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Locker types, sizes, hardware, and accessories.
   2. Initial selection color charts.
   3. Wood species and finish options.

B. Shop Drawings:
   1. Locker plan layout with numbering.

C. Schedules: Locker types.

D. Samples:
   1. Metal Lockers: 6 by 6 inch in size, of each color on base metal.

2. Phenolic Lockers: 6 by 6 inch in size, of each color.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.
   1. Include master lock codes.

B. Warranty documentation.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer trained or approved.

B. Field Samples: Construct one run of lockers. Demonstrate product interfaces, intersections, and terminations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Metal Lockers: Store inside building.
   2. Wood Based Products: AWI 200.

1.8 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer Warranty:
   1. Lockers: Warrant against product and installation failure.
      a. Warranty Period: 5 years.

PART 2 PRODUCTS

2.1 METAL LOCKERS

A. Welded Wardrobe Lockers, 002 and 007:
   1. Manufacturers and Products:
      a. ASI Storage Solutions Traditional Collection, as Basis-of-Design.
      b. Art Metal Products.
      c. List Industries.
      d. Lyon.
      e. Republic Storage Systems All Welded Corridor Lockers.
   2. Configuration: See Drawings for locker types and sizes.
      a. Tiers: Double.
      b. Overall Height: 78 inches.
      c. Width: 12 inches.
      d. Depth: 12 inches.
   3. Doors: Steel sheet, 0.075 inch minimum thickness; louver vents; sound absorbing core.
   4. Frames: Steel sheet, 0.060 inch minimum thickness.
   5. Body Components with Legs: Steel sheet, 0.024 inch minimum thickness.
   6. Hinges: Continuous; welded to frames.
   7. Latches: Recessed stainless steel cup design.
   8. Locking: Padlock hasps.
      a. Key Quantity: Two change keys per locker, five master keys.
   9. Finish: Thermoset enamel or powder coating.
      a. Colors: Mist Green #06.
   10. Number Plates: Aluminum.

2.2 LOCKER BENCHES

A. Locker Benches: Fixed pedestal supports.
   1. Manufacturers:
      a. ASI Storage Solutions, as basis of design.
      b. Or approved equal.
   2. Pedestals: Powder coated aluminum; round posts.
   3. Seats: Solid phenolic with HPDL tops.

2.3 PERFORMANCE

A. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

2.4 FABRICATION

A. Complete locker fabrication before shipment to site.

B. Attach number identification plates.

C. Fabricate sloping tops with valley joint at inside corners and vertical end panels.

D. Provide matching perimeter trim for site fitting.

E. Provide openings for electrical wiring.

2.5 FINISHES

A. Powder Coating: Thermoset polyester; AAMA 2603 but 1.5 mil minimum thickness.

B. Acrylic Coating: Thermoset enamel; AAMA 2603 but 1.5 mil minimum thickness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify locations and sizes of anchorage framing or backing.

3.2 PREPARATION

A. Condition laminate clad lockers in installation areas for 24 hours minimum before installing.

B. Coordinate anchorage locations for anchoring new lockers.

3.3 LOCKER INSTALLATION

A. Knocked Down Lockers: Assemble lockers square and without distortion.

B. Install lockers plumb, level, and aligned in plane.

C. Connect lockers into rigid, stable assemblies with flush, full contact joints.
   1. Fasten back to back locker groups together.

D. Anchor lockers to floor and to adjacent walls.

E. Install end panels, filler panels, sloped tops, and recess trim with concealed fasteners.

3.4 BENCH INSTALLATION

A. Set benches parallel to locker fronts.

B. Fasten bench pedestals with expansion anchors.

C. Set movable benches in rooms.

3.5 ADJUSTING

A. Adjust doors for smooth, accurate movement and secure latching.

B. Adjust drawers for movement free of binding.

3.6 CLEANING

A. Cleaning: Clean interiors and exteriors of lockers.

3.7 CLOSEOUT ACTIVITIES

A. Demonstration: Instruct Owner staff on reprogramming lock codes.

3.8 PROTECTION

A. Do not use installed lockers for storing construction materials or clothing.

END OF SECTION

SECTION 107320

PRE-MANUFACTURED CANOPIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Freestanding, pre-engineered metal canopies including concrete foundation, steel framing, metal roof, roof drains and leaders, fascia components, and metal ceiling and accessories.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Concrete islands and curbing.

B. Section 02870 - Bollards: Metal, concrete, and stone bollards.

C. Section 05500 - Metal Fabrications.

D. Section 07900 - Joint Sealers.

E. Division 15 - Plumbing: Plumbing services and connections.

F. Division 16 - Electrical: Electrical wiring and connections.

1.3 REFERENCES

A. American Institute of Steel Construction, Inc. (AISC): AISC 360 - Specification for Structural Steel Buildings (copyrighted by AISC, ANSI approved).

B. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures (copyrighted by ASCE, ANSI approved).

C. American Welding Society (AWS): AWS D1.1 - Structural Welding Code - Steel (copyrighted by AWS, ANSI approved).

D. ASTM International (ASTM):
1. ASTM A 36/A 36M - Standard Specification for Structural Steel.

E. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM MFM - Metal Finishes Manual.

F. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code

(copyrighted by NFPA, ANSI approved) - hereinafter referred to as NEC.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide pre-engineered canopies capable of withstanding the effects of gravity, wind, seismic, thermal and other project specific load conditions as required by the current building code for the site-specific location where canopy is installed:
   1. Uniform pressure as indicated on drawings - Minimum design loads per ACSE 7.
   2. OR Project Specific design requirements (to be provided by owner prior to canopy design).

B. Thermal Movements: Provide pre-engineered canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.5 SUBMITTALS

A. General: Submit under provisions of Section 01300 - Submittal Procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
   1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Submit shop drawings. Include plans, elevations, sections, details, and attachments to other work. Canopy supplier shall furnish complete canopy drawings signed and sealed by a professional engineer licensed in the state where the canopy shall be installed.

D. Samples:
   1. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer's color charts showing full range of colors and finishes available. Where finishes involve normal color variations, include samples showing the full, range of variations expected.

E. Certificates: Submit product certificates signed by the manufacturer certifying material compliance with specified performance characteristics and criteria, and physical requirements.

F. Warranty Data: Submit warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in engineering and manufacturing pre-engineered canopies with a minimum documented experience of twenty years and with an in-

house quality inspection program not by AISC or other certification program.

B. Welding: Qualify procedures and personnel according to the following:
   1. Welding shall be in accordance with AWS D1.1 (with E70XX electrodes).
   2. Steel shop connections shall be welded and field connections shall be bolted (unless otherwise noted on the Drawings). Shop welds may be changed to field welds with the approval of the project engineer.
   3. Slag shall be cleaned from welds and inspected. Steel shall be painted with red oxide rust-inhibitive primer (unless galvanizing specified).

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.

E. Product Options:
   1. Information on the Drawings and in the Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.
   2. The Drawings indicate size, profiles, and dimensional requirements of pre-engineered metal canopies and are based on the specific system indicated. Refer to Refer to Section 01600 - Product Requirements. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

F. Coordination:
   1. The Contractor shalll conduct site meetings to verify project requirements, substrate conditions, utility connections, manufacturer's drawings and installation instructions. Comply with Division 1 section on project meetings.
   2. The contractor shall prepare for and pour the concrete footers for the pre-engineered metal canopies. Manufacturer shall furnish recommended footing drawings as per IBC Section 1807.3 and prints and rebar details for concrete footings, as well as provide anchor bolts to be embedded in concrete footer. Such items shall be delivered to project site in time for installation.

1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Protect components and accessories from corrosion, deformation, damage, and deterioration

when stored at job site. Keep materials free from dirt and foreign matter.

1.8 PROJECT CONDITIONS

A. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.
   1. Established Dimensions: The Contractor shall, where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal canopies without field measurements. Contractor is responsible to coordinate footer locations and elevations with any interferences with or attachments to abutting structures.

1.9 WARRANTY

A. Austin Mohawk warrantees the products it manufactures to be free of defects in materials, leaks, and workmanship for 1 year from date of shipment.
   1. Austin Mohawk also offers a 20-year limited warrantee against peeling, flaking, chipping of canopy deck when properly maintained, and pass on manufacturer's warrantees for accessory items, replacement of materials only no labor coverage per vendor warranty coverages.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Austin Mohawk and Company, Inc., which is located at: 2l75 Beechgrove Place; Utica, NY 135O1; Toll Free Tel: 8O0-765-3l10; Tel: 3l5-793-3O00; Email: request info (info@austinmohawk.com);

B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 01600 - Product Requirements.

2.2 MATERIALS

A. Structural Steel:
   1. Material and work shall conform to the latest AISC 360.
   2. Structural steel shall be painted with a rust inhibitive (red oxide) primer (std).
   3. Structural steel shall be hot-dip-galvanized.

B. Sheet Metal:
   1. Decking: 3 inch (76 mm) by 16 inch (406 mm) by 20 gage smooth white or embossed available, ASTM A 653/A 653M GR40, Fy = 40 ksi, galvanized steel with baked enamel finish.

2. Center and Tapered Gutter: 20 gage hot-dip galvanized steel baked enamel finish.
3. Perimeter Gutter: 20 gage hot-dip galvanized steel baked enamel finish.
4. Internal Downspout: 3 inch (76 mm) diameter PVC.
5. External Downspouts: 3 inch (76 mm) by 4 inch (102 mm) Aluminum in 10' PRE-ENGINEERED METAL CANOPY.

C. General: Provide a complete, integrated set of manufacturer's standard design canopy components to form a pre-engineered canopy ready for installation on project site. Canopy steel framing consists of using stacked wide-flange roof beams which transfer loads to columns. Columns are designed as fixed base elements to transfer vertical & lateral loads and moments to concrete foundations. Columns are typically located in an area of site protected from drive lane traffic. Pre-engineered metal canopy shall be designed to meet all site specific design loads per Section 1.4.A or project specific requirements.

D. Canopy Fascia:
1. Aluminum Composite Panel (ACM): Available with a fluorocarbon paint finish, masked on one side. Shall be warranted for 5 -10 years depending on color and finish selection.
2. Standing Seam Steel MPN120 panels in 24 ga standard colors 70% PVDF resin-based coatings provide high performance durability for exterior and interior applications. These coatings are designed to resist fading, chalking and abrasion. Meets the requirement of AAMA 2605-13 for aluminum substrates.
3. Fascia: Various custom fascia to meet design requirements such as architectural shingle, EIFS, standing seam panels.

E. Canopy Finishes: Comply with NAAMM MFM for recommendations for applying and designating finishes.
1. 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.

F. Fabrication: Fabricate pre-engineered canopies completely in factory.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
2. Verify the rough-in of required mechanical and electrical services prior to placement of the structure.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. A work area shall be required extending 10 feet (3 m) beyond buildings and canopies in all directions to the extent practical. The work area shall be flat, comprised of hard-packed soil or gravel, asphalt, or concrete, and free of open excavation, debris, construction equipment and construction workers. An additional flat work space a minimum of 25 feet (7.6 m) by 25 feet (7.6 m) or as practical shall be provided adjacent to the canopy and/or building for unloading and storing materials. Site to meet OSHA guidelines to allow lift equipment and scaffolding to maneuver the work area.

B. Set pre-engineered metal canopy plumb and aligned. Level base plates true to plane with full bearing on concrete bases.

C. Fasten pre-engineered metal canopy columns to anchor bolts and/or foundation bolts.

D. Provide anchor bolts as follows:
   1. Anchor bolts or foundation bolts will be set by the Owner in accordance with approved site-specific drawings. They must not vary from the size and dimensions shown on the erection drawings. Use of a plywood template is recommended. Remove template prior to column erection.
   2. Anchor bolts shall conform to ASTM F1554 grade 55 and shall have a minimum of 7 inches (178 mm) of exposed thread and 23 inch (584 mm) minimum embedment with 1-1/4 inch (32 mm) nut and washer as embedment end.

E. Provide bolted connections as follows:
   1. Structural erection bolts shall conform to ASTM A 325/A 325M.
   2. Bolts shall be tightened to snug tight per latest RCSC specifications (unless otherwise specified).

F. Provide screws as follows:
   1. Fastening shall be performed per installation prints provided by the manufacturer.
   2. Self-drilling and self-tapping screws shall have a sufficient cut point and a 1/2 inch (13 mm) outside diameter dished metal-backed neoprene washer to be used in water sealing applications.

G. Provide pedestrian protection and warnings during construction which comply with local, Federal, and OSHA codes.

H. Prior to steel erection of any kind, the Contractor shall grade, backfill and otherwise prepare the job site to allow for rolling scaffold and ensure safe working conditions including the removal or relocation of overhead power lines.

I. Any grade or elevation situations which deviate from the approved manufacturer's plans shall be conveyed to the manufacturer prior to fabrication.

J. All anchor bolts and/or leveling plates shall be set within 1/4-inch (6 mm) tolerance on layout and grade level.

K. Temporary electrical power shall be provided.

L. Connect electrical power service to power distribution system according to requirements specified in Division 16 - Electrical.

M. Dumpster for trash and debris shall be provided by the Contractor.

3.4 ADJUSTING AND CLEANING

A. After completing installation, inspect exposed finishes and repair damaged finishes.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 107516

GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Aluminum flagpoles.

B. Products Installed, but Not Furnished, under This Section:
   1. Flag(s); furnished by Owner.

C. Related Requirements:
   1. Section 033000 "Cast-In-Place Concrete" for concrete footings for flagpole.
   2. Section 264113 "Lightning Protection for Structures" for connecting metal flagpole to lightning protection system.

1.2 ACTION SUBMITTALS

A. Product Data: For each specified system and assembly, including components and accessories.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpole.

B. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpole with heavy paper and enclose in a hard fiber tube or other protective container.

B. Unload, store, and erect flagpole in a manner to prevent bending and surface damage.

1.5 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of flagpole and accessories in accordance with manufacturers' written installation instructions.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain flagpole as complete unit, including fittings and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Flagpole assemblies to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

B. Structural Performance: Flagpole assemblies, including anchorages and supports, to withstand design loads within limits and under conditions indicated.
   1. Wind Loads: Determine in accordance with NAAMM FP 1001. Refer to Structural drawings for wind speed and pressure requirements.
   2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 GROUND-SET FLAGPOLES

A. Aluminum Flagpole: Fabricated from extruded tubing complying with ASTM B221 (ASTM B221M), Alloy 6063, minimum wall thickness of 3/16 inch, without visible seam.
   1. Manufacturers: Subject to compliance with requirements,
      a. Concord American Flagpole, or approved equal meeting the following performance requirements.
   2. Shape: Cone.
   3. Exposed Height: 30 feet.
   4. Construct flagpole in one piece if possible. If more than one piece is necessary, comply with the following:
      a. Fabricate shop and field joints without using fasteners, screw collars, or lead caulking.
      b. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
   5. Natural Satin Finish: Provide directional-sanded satin finish (AA-M33): buff complying with AA-M20.
   6. Anodized Finishes: Provide Class 1 finish complying with AA M32-C22-A41 (Clear Anodized) or AA M32-C-A42 (Color Anodized Finishes) in thicknesses ranging from 1 to 3 mils.
      a. Color: Bronze Tone

7. Powder Coated Finish: Thermo-set Polyester Powder Coated Finish, with a minimum thickness of 1.5 mils. Application shall be in a closed loop automated powder coating system to Ensure uniformity and quality of finish.
   a. Color: Bronze Tone
8. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.
   a. Flashing Collar: Same material and finish as flagpole.
9. Foundation Sleeve: Galvanized corrugated steel foundation sleeve, made to fit flagpole, for casting into concrete foundation.
   a. Flashing Collar: Same material and finish as flagpole.
10. Cast-Metal Shoe Base: Made from aluminum.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
   1. 0.063-inch spun aluminum with gold anodic finish.
   2. 20-oz. copper with 23-karat, gold-leaf finish.
   3. Spun stainless steel, finished to match flagpole.
   4. Spun copper alloy, finished to match flagpole.

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
   1. Halyard Flag Snaps: Stainless steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.
   2. Plastic Halyard Flag Clasps for Internal Halyard, Winch System: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clasps attach to flag and have two eyes for inserting both runs of halyards. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C33/C33M, fine aggregate.

D. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Section 079200 "Joint Sealants”.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concrete placement.

D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

E. Sleeves: Locate and secure sleeves in forms by bracing to concrete reinforcement and forms.

F. Place concrete as specified in Section 033000 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

G. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 INSTALLATION OF GROUND-SET FLAGPOLES

A. General: Install flagpoles where indicated on Drawings and in accordance with approved Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION

SECTION 111126

BUS-WASHING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. The work of this section includes furnishing all labor, materials, equipment, and accessories necessary to install and commission a completely automatic, drive-through, combination touchless and friction bus wash system to wash front, roof, rear, and both sides of buses. The size, quantities, and locations shall be as shown on the project drawings.
   2. The Manufacturer is responsible for the supply of necessary equipment, materials and service for the complete assembly and erection of the equipment so that it is ready for operation as per these specifications.

B. Principle Products:
   1. Bus washing system.
   2. Water reclamation system.

C. Related Sections.
   1. Section 01 33 00 - Submittal Procedures.
   2. Section 01 43 00 - Quality Assurance.
   3. Section 01 65 00 - Product Delivery Requirements.
   4. Section 01 66 00 - Product Storage and Handling Requirements.
   5. Section 01 71 00 - Execution and Close-Out Requirements.
   6. Section 01 78 00 - Close-Out Submittals.
   7. Section 22 05 00 - Common Work Results for Plumbing.
   8. Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

A. The reference publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by basis designation only.
   1. ASTM International:
      a. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
      b. ASTM A123/A123M - Standard Specification for Zinc Coating (Hot-Dip Galvanized).
   2. American Welding Society (AWS):
      a. AWS D1.1/D1.1 M - Structural Welding Code - Steel.
   3. National Electric Manufacturers Association (NEMA):
      a. ANSI/NEMA 250 - Enclosures for Electrical Equipment.

4. National Electric Code (NEC):
    a. ANSI/NFPA 70, Article 430 - Motors, Motor Circuits, and Controllers.
    b. ANSI/NFPA 79 - Electrical Standard for Industrial Machinery.
5. Underwriters Laboratory (UL):
    a. UL 508A - Industrial Control Panels.

1.3 SUBMITTALS

A. Product Data.
1. Submit Product Data in accordance with project specifications. Restrict submitted material to pertinent data.
    a. Include rated capacities, operating characteristics, electrical and mechanical characteristics for furnished components, assemblies and accessories used to produce the work of this section.
    b. All Product Data submittals shall identify proposed project-specific items, parts, and accessories clearly marked and discernible to the reviewer. Non-marked or generic product data submittals with no marks indicating items, parts or accessories will be cause for rejection.
2. Submit statements of compliance and supporting documents for the following:
    a. Signed statement by manufacturer that the product(s) comply with all requirements as specified.
    b. Vendor's certification stating compliance with ASTM 123 for zinc coating (hot-dipped galvanized) of steel.

B. Shop Drawing Submittals.
1. Submit Shop Drawings in accordance with project specifications. Restrict submitted material to pertinent data related to each element of the work of this section.
    a. Shop drawings shall provide plan-view layout and overall dimensions of each major component or assembly of the wash system, including utility connections.
    b. Include detailed equipment assemblies indicating dimensions, required clearances, components and location and size of each field connection.
    c. Include Bill-of-Material (BOM) for assemblies which make-up wash system.
    d. Submit wiring diagrams for power, signals, and controls.

C. Commissioning and Field Test Report.
1. Manufacturer shall submit final test report and applicable test data within ten (10) business days from completion of successful testing and commissioning of wash system. Comply with project specifications Div. 01 General Requirements as applicable.

D. Performance Submittals.
1. Statements and documentation of experience per requirements of Section 1.5 Quality Assurance for Manufacturer and Installer.

1.4 QUALITY ASSURANCE

A. Provide the wash system as a complete unit including controls and accessories produced or supplied by a single manufacturer.
   1. Test the assemblies and subassemblies, when practical, for proper operation prior to shipment.
   2. The Manufacturer must be a legal, U.S. based entity with not less than five (5) years of continuous product manufacturing of heavy vehicle wash systems.
   3. Manufacturer shall provide a technical representative to supervise work related to equipment installation, start-up, testing, and commissioning.
   4. If installation is performed by an independent Installer, the Manufacturer shall provide a letter stating the Installer is authorized and properly trained in the installation, adjustment, and operation of the wash equipment.
   5. Provide UL listing card or equivalent document of a Nationally Recognized Testing Laboratory (NRTL) from the company building the control panel(s) certifying that the panel(s) have been built to the electrical standards referenced in Section 1.3 of this specification.
   6. No deviations from these specifications will be allowed unless approved by Owner in writing prior to bid closing. All equipment and equipment functions must be built and designed to these specifications. Regardless of the owner's approval of any deviations and/or changes, the Manufacturer is solely responsible for the performance of the supplied equipment.
   7. Any speed or performance time is considered a minimum which must be met or exceeded.
   8. Any size or specific feature is considered a minimum which must be met or exceeded.
   9. All wash equipment and water recycling performance functions are minimums that must be met or exceeded.

B. Pre-Installation Coordination.
   1. Refer to project specifications for Project Management and Coordination specifications.
   2. Manufacturer to participate in any scheduled virtual, or if required, on-site meeting prior to the start of construction to discuss schedule, responsibilities, critical path items, and approvals. Participants include Manufacturer's Employee, Installer, Engineer, Architect, Contractor, all relevant trades, or others responsible for wash system installation and coordination.

C. Delivery, Storage and Handling.
   1. Package wash components for shipment by the Manufacturer and protect by means and methods suitable for the intended shipping and storage environments. Comply with Product Delivery Requirements of these specifications.
   2. Label crates and containers and provide shipping documentation identifying contents.
   3. General Contractor shall provide forklift and lifting provisions for material handling.
   4. General Contractor shall store equipment protected from weather, excessive humidity, excessive temperature variation, dust, dirt, or other contaminants. Comply with Product Storage and Handling Requirements of these specifications.
   5. Store all electrical equipment in an indoor, temperature-controlled location free from rodent infestation that might cause damage to electrical components.
   6. Store mechanical components in a covered and secured location.

7. Do not store equipment directly on the ground and protect from standing water or environmental conditions that may cause rust and corrosion.
8. Store equipment in an area that is not subject to damage from construction activities.

D. Equipment Warranty.
1. Manufacturer shall warrant the Product(s) against defects in material, workmanship, design and manufacturing for a period of one (1) year from the date of shipment from the factory, subject to Manufacturer terms and conditions in effect at the time of shipment.
2. The Manufacturer shall repair or replace, at Manufacturer's sole discretion, any defective Product(s) provided that:
3. Customer gives manufacturer written notice or submits Warranty Claims Request.
4. The Product(s) was installed by the Manufacturer or approved installer.
5. The Product(s) have not been altered or modified, subject to improper storage, misuse, improper maintenance, negligence, improper installation, or repaired with parts not authorized by Manufacturer.
6. Maintenance reports documenting adherence to Manufacturer's preventative maintenance requirements from date of delivery to date of warranty claim.
7. The warranty does not cover, and may not be limited to, damage due to abuse, misuse, natural disasters, damage in storage, excessive vehicle speed, temperature extremes, long-term flooding or lack of proper drainage, buildup of debris, improper electrical power feed voltage or frequency, or damage sustained by vehicle impact.

PART 2 PRODUCTS

2.1 MANUFACTURER AND MODEL

A. Basis of Design: Subject to compliance with requirements, provide InterClean Equipment, XJ404 FF- WR bus wash, or a comparable product by one of the following:
1. NS Wash Systems 3000 Series (Model 3000).
2. Westmatic Transit-Master.

B. Alternate Manufacturer/Approved Equal requests: Requests for approved equal must be submitted in writing to the Architect/Design Engineer/Contracting Officer no less than 10 calendar days prior to the bid or proposal due date.
1. Submit a detailed, written Comply, Deviate, Exception (C, D, and E) analysis for each specification line item of the proposed alternate wash system versus the specified wash system.
2. Provide documentation as appropriate to support C, D, and E analysis.
3. Provide a complete list of bus wash system installations for the last five (5) years listing duration of service, and application. Include the name and contact information of a person who is familiar with the wash system at that location. Based on information supplied and discussions with contact person, the Engineer will determine acceptability of the proposed Manufacturer and equipment.

C. Compliance with the specified wash system function, operation, and performance are mandatory. Deviations are not allowed.

D. Additional costs resulting from substitutions of products other than specified, including drawing changes and construction, shall be at the General Contractor's expense.

2.2 WASH SYSTEM PERFORMANCE PARAMETERS

A. The bus wash system shall be sequentially actuated by the bus passing through the wash system at 1 to 1.5 feet per second. All washing operations and related water recycling operations shall be automatic.
   1. The bus enters the wash and receives full soap on front, sides and rear.
   2. The four-brush friction washes the sides and rear of the bus. The front pair shall be fixed, and rear pair shall wrap the rear of the bus as it passes through the brush module.
   3. The bus enters the high-pressure wash arches, and the front and rear of the wash receives supplemental cleaning with high pressure spraying from the sides.
   4. Using reclaimed water, the bus under chassis is washed by under-floor mounted spray bar and wheels are washed by separate vertical manifolds.
   5. After bus leaves the high pressure/brush station, it receives a pre-rinse and a final rinse.

B. The wash system shall satisfactorily remove most visible heavy dirt accumulation, film, and iron oxidation from the Owner's buses when driven through the wash system at the stated speed. The evaluation of the system's ability to remove road film shall be determined only after the bus has been completely washed and has dried.

C. No acids containing fluorides (HF or ABF) shall be allowed.

D. The Manufacturer is solely responsible for the equipment's performance. Should the equipment not perform, as per these specifications, the Manufacturer shall modify, add or alter the equipment supplied at the Manufacturer's expense until the performance is satisfactory.

2.3 WATER RECLAMATION PERFORMANCE PARAMETERS

A. The water reclamation system shall process water from the bus wash by means of settling pits, in-line filters, and bio-remediation system. The system must supply sufficient water volume regardless of the frequency of wash.
   1. The equipment Manufacturer explicitly assumes the responsibility for designing the water reclamation system for the intended purpose and further warrants all performance requirements are understood prior to bidding.

B. Prior to final acceptance of the system by the Owner, the Manufacturer shall demonstrate the continuous operating capacity of the reclamation system by running (in manual override) both the both the high-pressure wash system and the water reclamation system for a minimum of 60 mins.
   1. No manual adjustments are allowed during the test.
   2. No manual or automatic freshwater fill of the reclaim pit is allowed during the test.
   3. Resetting the pre-programmed maximum cycle time is permitted as needed to obtain the required demonstration time.

C. The odors must be kept in total control without the use of any chemicals. The Manufacturer

shall guarantee for three (3) years, from date of final acceptance, that the system will adequately control objectionable odors and prevent algae build-up in wash water.

D. Include a bioremediation system in the reclamation system. Design the bioremediation system to eliminate and/or reduce the total hydrocarbon loading in the reclaimed water.
   1. Include enzyme dispensing and aeration system.

2.4 FINISH

A. All major steel components in wash bay, unless otherwise listed, shall be hot dip galvanized per ASTM A123. Coatings which utilize zinc rich primers or other anti-corrosive treatments are not acceptable.

2.5 WASH SYSTEM TECHNICAL SPECIFICATIONS

A. Chemical Arch.
   1. The operation and position of the arch shall be determined by the Manufacturer to provide optimum detergent coverage.
   2. Provide one (1) multi-manifold arch for high pH detergent.
   3. Provide two (2) Dosatron detergent proportioners with adjustable injection stem to provide detergent dilution range from 1:200 (0.5%) to 1:20 (5%) and separate control of detergent concentration to the rear.
   4. Alternate proportioners include Inject-o-Meter or engineer approved equal. Injectors must be positive displacement type.
   5. Fabricate arches with 1.25-inch diameter stainless steel pipe with stainless arch supports fastened to floor. Equip each arch with single or double nozzles with check valves for even detergent application on front, rear, sides, and roof of bus driving under arch.
      a. Design arch to immediately activate detergent application when vehicle position is detected.
      b. Stainless is required. No substitutions are allowed. Supply piping to arch may be stainless steel or PVC.
      c. Secure arch supports to concrete floor with stainless anchors.
   6. Activate arches with photo eyes mounted on adjustable height stands designed to activate with all bus sizes in Owner's fleet.
   7. Furnish 3 HP water booster pump for consistent water pressure to detergent proportioners.
   8. Provide twin tank, alternating and metered water softener. Alternate regeneration tanks to allow continuous supply of softened water from one tank while the second tank is regenerated.
      a. Water softening system shall reduce the hardness to less than 3 grains to increase the efficacy of the detergent and reduce detergent consumption.
      b. System design shall be based upon the hardness test of the water supply. If the domestic water supply is less than 3 grains hardness, supplier shall provide Owner test results proving the water hardness is acceptable without use of a water softener.
      c. Size water softener to meet or exceed water demand for detergent arch.
   9. Provide a 199K BTU natural gas water heater to heat softened water feeding detergent arches.

10. The Manufacturer is responsible for sizing the water heater to meet demand based on frequency of wash and train length.

B. Counter-Rotating 4 Brush Module.
   1. The bus wash system shall have a total of four (4) brushes. Brush configuration includes two (2) fixed position front brushes for cleaning the sides, and two (2) wrapping brushes for cleaning the sides and the rear of the bus.
   2. The brushes on each side of the bus shall counter-rotate to eliminate streaking.
   3. The brush assemblies shall consist of, but not necessarily be limited to support frame(s), brush segments, brush center columns, column bearings, fixtures, motors, and drives.
   4. The rotary brushes shall be driven electrically by a minimum of 2 HP motors.
      a. Motors shall have a splash-proof rating.
      b. Provide manually greased or factory greased and sealed bearings. If manually greased bearings are provided, seals on the stator side of the motor shall be installed to prevent grease migration into the motor interior.
      c. Gear reducers shall be totally enclosed. Belt drives are not acceptable to the Owner.
   5. All brush column bearings shall be ball or roller type, meeting the requirements of AFBMA L50, having a median life of 200,000 hours.
      a. The brush column bearings shall be sealed on the brush side and lubricated from track level without the use of ladder.
   6. All brushes shall be furnished complete with brush segments firmly affixed to a vertical brush bearing shaft. Brush shafts shall be affixed to mounting arms bolted to the frame.
   7. The movable rear brushes on each side of the bus shall be independently controlled. Movement of the brushes shall be by air-over-oil system. Systems that rely solely on pneumatics or solely on electric to move brushes are not acceptable to the Owner.
      a. The rear brush pneumatic panel will control the pressure of the brushes exerted on the side and rear of the bus. Should the system experience a loss of compressed air, the system will automatically deactivate, and an alarm will announce on the main control panel.
   8. Activation and timing of the rear brushes must be precise. The activation of higher air pressure for the rear brushes to wrap the back of the bus must not take place while the brushes are on the side of the bus. The higher air pressure must activate immediately as the bus rear corner passes the rear brushes. It is up to each supplier to select the method to achieve the proper wrapping action.
   9. Hot dip galvanize the support structure.
   10. Include water spraying manifolds that activate and de-activate when the brushes are started and stopped. Include a Dosatron detergent proportioner or similar to inject a brush lube onto the brushes.

C. Intensified Front and Rear Wash Arches.
   1. The high-pressure arches shall be made of 2-inch schedule 40 galvanized pipe with fifteen nozzles to supply combined water output of 150 GPM @ 120 PSI.
      a. Oscillating nozzles are not acceptable to the Owner. The Manufacturer is solely responsible for the performance warranty.
   2. Activate arches with photo eyes mounted on adjustable-height stands designed to activate with all bus sizes in Owner's fleet. Wire sensors to watertight junction boxes with drain holes.
   3. Use reclaim water to supply the high-pressure pump.

D. High-Pressure Pumping Module.
   1. Supply centrifugal diffuser-type high-pressure pump, as manufactured by ITT/Goulds, capable of producing pressures up to 120 PSI with maximum flow up to 150 GPM.
   2. Suction, discharge, stage and diffuser casings shall be ductile iron.
   3. Casing design will permit hydrostatic testing to 150% of maximum pumping pressure at operating speed.
   4. Bronze impellers shall be suction type and balanced to minimize axial thrust loads. Eash impeller shall be individually keyed to pump shaft.
   5. Bearings must have an average operational life of 50,000 hours. Bearings must be greaseable.

E. High-pressure pump shall be driven by a squirrel cage induction motor suitable for across-the-line starting with a minimum rating of 30 HP and include soft start. The motor shall be totally enclosed fan cooled (TEFC) and operate on 460V, 3-phase, 60 hertz with a service factor of 1.25.

F. Final Rinse Arch.
   1. Supply final rinse arch with reverse osmosis (R/O) permeate water.
   2. Operation and position of arch shall be determined by Manufacturer to provide optimum rinse water coverage.
   3. The arch shall be fabricated with 1.25-inch diameter stainless steel pipe with twenty-four (24) double swivel nozzles with check valves for even and thorough application of rinse water to front, rear, sides and roof of vehicle driving under arch.
   4. Activate arch with photo eyes mounted on adjustable height frames. Design and install assemblies to activate with all vehicle sizes. Wire activators to watertight junction boxes with drain holes.
   5. Furnish 5 HP water booster pump for consistent water pressure to rinse nozzles.

G. Tire Guides.
   1. Tire guides shall run full length of wash system on both sides of vehicle.
   2. Angle tire guide at entrance and cover all ends with round, smooth welded steel caps.
   3. Fabricate tire guides from 4-inch diameter steel pipe and support with brackets at 5-foot intervals.
      a. Fabricate brackets with minimum ½" steel plate with holes for anchoring.
      b. Hot dip galvanize all tire guides after fabrication.

2.6 SYSTEM CONTROLLER AND COMPONENTS

A. Panels and controls must be built according to these specifications. Substitutions are not allowed. The control system shall be PLC based with separate HMI and must be designed by the Manufacturer.

B. The PLC shall be the centralized process application controller and provide near real time control of the entire wash system and integration with other systems.
   1. Connect PLC to a distributed I/O via an Ethernet network. The operator interface shall be through a separate HMI, not integral to the PLC, and connected to the PLC via Ethernet. Provide I/O capacity for future expansion.
   2. Provide terminal windows for monitoring and troubleshooting communication problems

with any devices communicating to PC via Ethernet, RS232, etc.

3. Initialize all devices to a known state at start-up. Store all configurable settings such as timing set points, alarm settings, and communication settings in PLC and removable storage device. Alarms must have user configurable delays to prevent nuisance tripping.
4. System settings such as baud rates, parity, com port configurations must be reconfigurable without need to recompile application software.
5. Failure of any components shall disable the entire wash system.

C. The Industrial Control Panel shall be manufactured and evaluated to Underwriters Laboratories, Inc. (UL) standard 508A -Industrial Control Panels. Panel shall be evaluated for short circuit withstand capacity and shall bear the appropriate UL marks including the short circuit withstand value mark as part of the official UL label.
   1. Panel must be designed for 460 V, 3 phase, 60 Hertz with a short circuit capacity of 10,000 amperes RMS symmetrical at incoming line terminals of control panel.
   2. Panel must be designed to meet the requirements of NEC ANSI/NFPA 70, Article 430 and ANSI/NFPA 79 - Electrical Standard for Industrial Machinery.
   3. Control panels that are not UL approved and labeled are not acceptable to the Owner with no exceptions.

D. Mount PLC and HMI in NEMA 4 rated electrical enclosure.

2.7 WATER RECLAMATION AND TREATMENT TECHNICAL SPECIFICATIONS

A. Sump Pump.
   1. Provide minimum 7.5 HP self-priming sump pump for transferring water from sump pit to the above ground reclaim water tank.
   2. The minimum capacity of the sump pump shall be 300 GPM. Capacity of sump pump shall allow for the pressure losses from two cyclone separators used in series. Flow rate after the pressure losses across cyclones shall be equal to or greater than the high-pressure wash water usage.
   3. Sump pump must handle solids found in wash water with little to no wear or decrease in capacity.

B. Cyclone Separators.
   1. Provide at least two (2) cyclone separators in series where cleaned water from the first cyclone separator passes through second cyclone separator to ensure maximum solids removal.
      a. Cyclone separators shall provide second and third stage filtration after sump pump intake filter.
   2. Downflows from cyclones separators shall be pumped back to the exit end of the wash bay trench pit with a solids handling pump.
      a. The solids handling pump shall be activated when cyclone separators require purging.
      b. Solids removal from cyclone separators using only gravity is not acceptable to Owner.

C. Aeration System.
   1. Provide a system to pump aerated water into the trench pit to prevent algae and odor

build-up.
   a. Distribute aerated water throughout the reclaim pit by circulating water even when the wash system is not operating.
   b. No odors from algae are permitted.
   c. No odor masking deodorants or other chemical to kill odors is allowed.

D. Stainless Steel Intake Filter.
   1. The sump pump intake filter shall be InterScreen, or engineer approved equal. Wire mesh filters are not acceptable to Owner.
      a. Slotted orifices shall be sized 0.015" or smaller and prevent dirt from clogging water spray nozzles.
      b. Intake filter shall be constructed of stainless steel.
      c. Equip intake filter with compressed air backwash that automatically actuates to maintain unrestricted water flow to sump pump.

E. Reclamation Tank.
   1. The reclamation tank shall be made of linear low-density polyethylene with a holding capacity to allow a minimum continuous flow of 300 GPM of reclaim water to the high-pressure wash system.
   2. The tank shall have a conical bottom with minimum of 35-degree slope and be fitted with a 6" bottom manhole, float switch connections and other required fittings.
   3. Tank bottom shall be supported with a steel support cradle with ½" thick polyethylene continuous support band around conical bottom.

F. Enzyme-Catalyzed Water Treatment System.
   1. Provide a biological water treatment system to eliminate and/or reduce the total petroleum hydrocarbon loading within the reclaimed wash water. When use in conjunction with the specified recycling equipment, the system will remove both organic contaminants and inorganic particulate from the reclaimed water stream.
   2. The treatment system shall automatically inject specialized biological products and enhancements specifically suited for wash water treatment applications, including degradation of petroleum hydrocarbon components commonly found in vehicle wash systems.
      a. Use low flow injector pumps to continuously dispense biological product at an adjustable rate of 0.5 to 1.5 liters per day.
   3. The biological products and enhancements shall be injected directly into the circulation/aeration discharge pipe running to the wash water reclaim pit. Oxygen shall be provided by the aeration pumping and mixing system.

2.8 SYSTEM OPTIONS

A. Reverse Osmosis System.
   1. Provide a reverse osmosis system capable of producing 6,600 gallons per day of permeate water to the final rinse arch. Use concentrate water from the reverse osmosis process as make-up water for the pre-rinse arch prior to the final rinse arch.
   2. Provide piping and connections between components as required for a complete and operable system. Include flow meters, 1 to 10 GPM, flow control valves and pump throttle valves to allow adjustment of system's pressure and flow rate of permeate and

concentrate water.
   a. R/O system shall include the following as standard equipment:
   b. Water softener (can be shared with chemical arches water supply).
   c. Activated carbon filter.
   d. 5-micon cartridge pre-filter.
   e. 1 HP booster pump.
   f. 5 HP pressurization pump.
   g. Control panel with PLC and HMI touch screen interface panel.
   h. Stainless steel frame.
   i. Two (2) 925-gallon holding tanks with floats.
3. The control system shall consist of a PLC and HMI to control pumps and valves mounted on the R/O frame. HMI touchscreen shall be at least 7 inches.
4. The R/O system shall allow for manual operation of inlet valves, flush valve, and jogging of R/O frame mounted pumps. The R/O control system must provide for configuration and adjustment of pressure set points, run times, automatic flush time, and delay settings.
5. Display faults for E-stop activation, pump fault, circuit protection tripped, inlet pressure minimum, outlet pressure min and max, and outlet conductivity.
6. Monitor inlet and outlet pressures at high pressure pump. If pressures are out of range, the system shall stop the pump and close water inlet solenoid to prevent pump damage.
7. Automatically backwash carbon filter to remove trapped contaminants.

B. Pre-Rinse Arch.
1. Supply pre-rinse arch with reverse osmosis (R/O) concentrate water.
2. Operation and position of arch shall be determined by Manufacturer to provide optimum rinse water coverage.
3. The arch shall be fabricated with 1.25-inch diameter stainless steel pipe with twenty-four (24) double swivel nozzles with check valves for even and thorough application of rinse water to front, rear, sides and roof of vehicle driving under arch.
4. Activate arch with photo eyes mounted on adjustable height frames. Design and install assemblies to activate with all vehicle sizes. Wire activators to watertight junction boxes with drain holes.
5. Furnish minimum 3 HP water booster pumps for consistent water pressure to rinse arch.

C. Under Chassis Spray Bar and Wheel Wash.
1. Under chassis manifold shall consist of 1.25-inch galvanized pipe with 9 nozzles.
2. The under-chassis wash shall provide a minimum of 60 GPM @ 60 PSI of reclaimed water.
3. Provide two (2) wheel wash manifolds, one on each side.
   a. Each manifold shall use 4 nozzles capable of spraying 15 GPM @ 60 PSI.

D. Roof Mop.
1. The hanging roof mop shall wash the top of the bus and the upper part of the front window. Design the roof mop to not interfere with any mirrors or other protrusions of the buses.
2. Hang mop curtain from free-standing galvanized steel 2" sch.40 pipe anchored to the concrete.
3. The mop curtain shall have 4 rows of vertical cloth.
   a. Equip each row of the mop with a top mounted horizontal pipe. Each pipe shall have

a minimum of 5 nozzles to spray alkaline detergent on the mop.

PART 3 EXECUTION

3.1 MECHANICAL INTERCONNECTING PIPING

A. All field plumbing and mechanical work will be done by the Mechanical Contractor contracted by General Contractor, including:
   1. Water up to and including connection to the equipment.
   2. Interconnecting piping between various equipment components located in the equipment room.
   3. Interconnecting piping, above ground or under slab, between the equipment located in the equipment room and the equipment located in the wash bay.
   4. Furnish and install backflow preventer if required.
   5. Duct and roof penetration for natural gas water heater if required.

3.2 ELECTRICAL INTERCONNECTING WIRING

A. All field electrical work will be done by the Electrical Contractor contracted by General Contractor, including:
   1. Electrical service up to and including connection to the equipment panel.
   2. Interconnecting conduits and wiring between various equipment components located in the equipment room.
   3. Interconnecting conduit and wiring, above ground or under slab, between the equipment located in the equipment room and the equipment located in the wash bay.

3.3 EXAMINATION

A. Contractor/Installer shall document site conditions that significantly differ from design drawings that may negatively impact performance of wash system to be installed.

B. Provide system specification or functional requirements to support the need for correcting deviation(s).

C. Do not perform any field work, correct any deficiencies, or undertake installation until identified deficiencies and work required for correction have been reviewed and approved by Designer of Record or Owner/Operator or Construction Manager.

D. The Installer shall examine the wash system for workmanship, finish, and dimensional accuracy. Compare delivered equipment with packing lists and specifications to assure receipt of all items prior to commencing installation. Document all findings.

3.4 PREPARATION

A. Manufacturer shall participate in scheduled pre-construction conference (call) with Customer's project team.

B. Before installation, the Installer shall verify that site conditions agree with contract drawings. Inspect locations of rough-in work and utility stub-outs to ensure they match with equipment to be installed. Document any discrepancies or deviations that will affect system performance and report findings to Engineer or Architect.

3.5 INSTALLATION AND FIELD QUALITY CONTROL

A. Install according to manufacturer's instructions and approved submittals.

B. Coordinate field inspection in accordance with requirements of project specifications for Construction Progress Documentation.

C. The wash system shall be installed by the Manufacturer's employee, or by Manufacturer approved Independent installer as required in section 1.6.D of this spec.
   1. Employee or Installer shall be qualified and experienced in the installation, adjustment, and operation of equipment.

D. The manufacturer's employee shall supervise final connections, adjustments, calibration, and final testing of equipment.

3.6 COMMISSIONING AND FIELD TESTING

A. The initial equipment start-up and testing shall be performed by the Manufacturer's employee. Comply with testing requirements of the project specifications.
   1. Make all necessary adjustments as required.
   2. Pre-operation checks and start-up shall be in accordance with Manufacturer's Operation and Maintenance (O&M) manual.
   3. Check all wiring connections and power voltage before energizing.
   4. Arrange for an adequate amount of detergent for performance testing.

B. Check operation of all systems or equipment directly controlled by the wash system to ensure all functions, controls, monitors, and indicators are functioning properly and operating as a system.

C. Conduct field test, witnessed by Owner, to demonstrate the system complies with the requirements specified.

D. Manufacturer shall submit final test report and applicable test data demonstrating compliance with performance criteria of this specification within ten (10) business days from completion of successful testing and commissioning of wash system.

3.7 FIELD TRAINING

A. Provide on-site field training in the operation and maintenance of the wash for designated Owner personnel including facility service technicians.
   1. Training shall be provided by the Manufacturer's employee or designated representative.
   2. Training shall be no less than 4 hours during normal business hours.
   3. Provide training for up to ten attendees.
   4. Conduct training after substantial completion, but before final acceptance.

B. Train attendees on wash operation, operational safety, maintenance, adjustment, cleaning, and manual operation.

C. Deliver electronic copy of busing manual plus (2) additional hard copies of the O&M manual to the project site.

3.8 CLOSE-OUT DOCUMENTATION

A. Submit the following in accordance with Div. 01 General Requirements for Closeout Submittals:
   1. O&M manuals.
   2. As-Record drawings derived from contractor supplied As-Built drawings.
   3. Wash specific Preventative Maintenance instructions and service schedule. readiness.
   4. Manufacturer recommended spare parts list with part numbers, quantities, and pricing.
      a. Include components which are not readily available from local or commercial sources, but which are critical to the operation of the system.
      b. Spare parts are those that can be field replaced. Consumables are items frequently required for maintenance and service such as lights, fuses, lubricants, hydraulic fluid, filters, etc.
      c. Provide part numbers, quantities, descriptions, and current unit prices.
      d. Manufacturer's Equipment Warranty statement.

END OF SECTION

SECTION 111426

TRANSIT FARE COLLECTION VAULT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Heavy-duty, standalone mobile revenue collection vaults designed for secure, touchless currency transfer from vehicle fareboxes.

B. Integral interlocking mechanical cashbox receiver mechanisms providing physical lock controls.

C. Interior mobile collection bins with integrated high-capacity bill and coin separation compartments.

D. Embedded electronic audit logging and identification module components.

1.2 REFERENCES

A. ASTM International: Applicable material standards for structural carbon steel plate and protective industrial coatings.

B. National Electrical Code (NEC): Applicable for low-voltage battery configurations, internal electronics, or security accessories.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Provide a fully mechanical, electricity-independent primary vault mechanism that facilitates hands-free cashbox opening, emptying, and re-locking without power input.

B. Security Sequence: System must utilize closed-loop, physical interlock mechanics ensuring cashbox lids remain strictly locked at all times when unattached to either a vehicle farebox or the vault receiver assembly.

1.4 SUBMITTALS

A. Product Data: Manufacturer's technical data sheets including dimensional layouts, structural weight parameters, and physical anchoring requirements.

B. Operations & Maintenance (O&M): Manufacturer documentation covering bin extraction processes, interlocking mechanism adjustment, and configuration of electronic tracking or back-office interfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Base Product/Manufacturer: Genfare (a division of SPX Corporation), Elk Grove Village, Illinois; Model Line: Genfare DualPort Vault System (Mobile Vault Unit Configured for Fuel/Wash Lanes).

B. Comparable Manufacturer 1: Scheidt & Bachmann GmbH, Mönchengladbach, Germany (North American Division: Lowell, Massachusetts); Model Line: FareGo Cash Receiver System (CRS). System must match base specification via closed-loop mechanical interlock revenue transfer from FareGo farebox models.

C. Comparable Manufacturer 2: TAG Canada, Montreal, Quebec, Canada; Model Line: Fusion Vacuum / Classic Mechanical Vault System. System must match base specification via touchless, contactless cash emptying using heavy-gauge high-security armor steel or pneumatic vacuum evacuation.

2.2 MATERIAL & STRUCTURAL COMPONENTS

A. Enclosure Frame: High-strength, weather-resistant structural heavy carbon steel plate or high-grade reinforced stainless steel construction. Structural integrity must resist environmental degradation, including constant exposure to engine oils, diesel fuel, road salt, and industrial washing chemicals.

B. Cashbox Receiver Assembly: Proprietary or multi-compatible dual-port design engineered for physical compatibility across specified transit fareboxes (e.g., Genfare CentsaBILL/Odyssey/Fast Fare, Scheidt & Bachmann FareGo Series, or TAG Canada systems).

C. Removable Bin Capacity: Total financial storage capacity of up to $20,000 total value, split between discrete, secure sorting spaces for $10,000 in coins and $10,000 in bills.

2.3 MECHANICAL & ELECTRONIC FEATURES

A. Mechanical Operations: Internal lever-actuated, self-opening receivers requiring zero external

electricity for basic physical dumping operations.

B. Electronic Audit / Tracking Module: Integrated low-power electronic ID receiver module or smart-cartridge tracking system capable of logging individual cashbox transactions, verifying Bin ID metrics, and registering timestamped logs of all bin removals and installations.

C. Auxiliary Alarms: Provision for integration with facility security loops via pre-wired optional security alarm dry-contact hookups or back-office enterprise network suites.

2.4 PHYSICAL CHARACTERISTICS

A. Vault Unit Weight (Empty): Approximately 460 lbs (209 kg) minimum base weight to guarantee physical blast/pry resistance.

B. Vault Unit Weight (Full): Maximum capacity load constraints limits to approximately 1,200 lbs (544 kg).

C. Structure: Free-standing, self-supporting framework requiring no overhead enclosures, gantries, or auxiliary external building supports.

PART 3 EXECUTION

3.1 PREPARATION & SITE INSPECTION

A. Substrate Verification: Ensure installation concrete pads along fuel lanes or maintenance tracks are level, plumb, and structurally rated to sustain a minimum loaded weight of 1,200 lbs per footprint.

3.2 INSTALLATION

A. Anchoring: Install the mobile vault unit directly onto designated surface lines in strict accordance with manufacturer engineering diagrams and architectural structural plans.

B. Clearance: Ensure unencumbered clearance radii for vault door articulation and smooth, rolling extraction of internal mobile storage bins without geometric interference with passing transit vehicles.

3.3 TESTING AND COMMISSIONING

A. Functional Testing: Execute a minimum of five (5) consecutive test insertions using non-revenue farebox cashboxes to ensure proper activation of the touchless physical interlock mechanism and secure latch-back resets.

B. Data Verification: Confirm that the electronic ID module accurately registers cashbox metrics and logs timestamps to the remote, cloud, or enterprise auditing infrastructure without data packet dropping.

END OF SECTION

SECTION 113013

RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Residential appliances.

B. Principal Products:
   1. Refrigerator.
   2. Freezer.
   3. Ice maker.
   4. Oven and Range.
   5. Range Hoods.
   6. Microwave ovens.
   7. Dishwasher.

C. Related Requirements.
   1. Section 018113: Sustainable design requirements.
   2. Section 102800: Toilet, bath, and laundry accessories.
   3. Division 22: Plumbing connection requirements.
   4. Division 26: Electrical connection requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Show profiles, sizes, required clearances, utility rough in sizes and locations.
   2. Show data and power requirements.
   3. Initial selection color charts.

B. Shop Drawings:
   1. Customized Appliances: Show sizes, finishes, and installation details.

C. Schedule: Appliance information for each type of residential unit and application.

1.4 CLOSEOUT SUBMITTALS

A. Operating and maintenance instructions.

B. Manufacturer warranties.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Manufacturer recommended parts and quantities.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

PART 2 PRODUCTS

2.1 APPLIANCES

A. Appliances, General:
   1. Conform to applicable code for UL approvals.
   2. Certification Labels:
      a. ENERGY STAR: Appliances follow EPA/DOE ENERGY STAR product labeling program.
   3. Accessibility Requirements: Accessible appliances follow Department of Justice publication 2010 ADA Standards for Accessible Design, FHA or ICC/ANSI A117.1, and state accessibility code.

B. Residential Appliances:
   1. Manufacturers and Products: See Equipment Schedule on Drawings.
   2. Color: See Drawings and Architect selected.

C. Miscellaneous Materials:
   1. Supply fittings and other devices needed for installation.
   2. Supply touch up materials for exposed painted finishes.

2.2 PERFORMANCE

A. Sustainable Performance: See Section 018113 for additional requirements.
   1. Material Ingredients: Use materials with ingredients compliant with requirements.
   2. Material Low VOC: Use materials tested for VOC levels compliant with requirements.
   3. Material Sourcing: Source materials using sustainable methods compliant with requirements.

4. Material Recycling: Use materials containing recycled content compliant with requirements.
5. Local Materials: Use locally produced materials compliant with requirements.
6. Embodied Carbon: Use materials produced using sustainable practices compliant with requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that utility services and electrical power match appliance requirements.

3.2 INSTALLATION

A. Remove packing materials before installation.

B. Set and adjust appliances level and plumb, and with faces in alignment with adjacent surfaces.
   1. Tighten leveling nuts and other adjustment devices against loosening.

C. Freestanding Appliances: Place units in final locations after wall and floor finishes have been completed.

D. Built-In Appliances: Securely anchor units to supporting cabinets or countertops with concealed fasteners.

E. Verify loose accessory items are properly installed.

F. Connect appliances to utilities and make units operational.

G. Adjust appliances for smooth operation under loaded conditions.

H. Test each appliance to verify proper operation.

I. Clean exposed surfaces, loose accessories, and interior surfaces of compartments and doors.

END OF SECTION

SECTION 115213

PROJECTION SCREENS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Electrically operated, front-projection screens and controls.

B. Principal Products:
   1. Projection screen.
   2. Installation accessories.

C. Related Requirements:
   1. Section 018113: Sustainable design requirements.
   2. Section 101100: Visual display surfaces.
   3. Division 26: Electrical requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate layout and installation of front-projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, and partitions.
   2. Coordinate rough in and electrical connections with screen motor wiring.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show layouts and types of front-projection screens. Include the following:
   1. Drop lengths.
   2. Location of seams in viewing surfaces.
   3. Location of screen centerline relative to ends of screen case.
   4. Anchorage details, including connection to supporting structure for suspended units.
   5. Details of juncture of exposed surfaces with adjacent finishes.
   6. Location of wiring connections for electrically operated units.
   7. Wiring diagrams for electrically operated units.
   8. Accessories.

C. Sustainable Design Submittals: See Section 018113 for additional requirements.
   1. Material Ingredients: Provide documentation of sustainable contents and materials.
   2. Material Low VOC: Provide documentation of low VOC testing for materials.
   3. Material Sourcing: Provide certification of sustainable sourcing of materials.
   4. Material Recycling: Provide documentation of recycled content of materials.
   5. Local Materials: Provide certification of materials produced locally.
   6. Embodied Carbon: Provide documentation of sustainable production of materials.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For front-projection screens to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.

B. Worker experienced in performing work of this section who has specialized in work similar to that required of this project.

C. Manually operated projection screens must meet requirements of building codes and zoning bylaws issued by federal, state and local government authorities having jurisdiction (AHJs). Ensure that project specification section reflects the need to meet these requirements.

1.6 DELIVERY STORAGE AND HANDLING

A. Deliver, store, and handle products in accordance with manufacturer’s instructions.

B. Deliver in manufacturer’s original packaging with identification labels intact.

C. Store protected from exposure to harmful weather conditions, and at temperature conditions in accordance with manufacturer’s instructions.

D. Handle with care to avoid damage. Do not install damaged products.

E. Waste Management and Disposal.
   1. Separate waste materials for recycling with Construction Waste Management and Disposal sections within Divisions 1 and/or 2 of this project.
   2. Remove packaging materials from site and dispose of at appropriate locations or facilities.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install front-projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC

system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

A. Manufacturer Standard Warranty: For material and workmanship.
   1. Warranty Period: Five years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Projection Screens: Obtain front-projection screens from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.

2.2 ELECTRICALLY OPERATED, FRONT-PROJECTION SCREENS

A. General: Manufacturer standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. 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. Controls: Remote, three-position control switch installed in recessed device box with flush cover plate.
   3. End-Mounted Motor: Instant-reversing, gear-drive motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Locate motor in its own compartment on left end of screen unless otherwise indicated.
   4. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8 inch diameter metal rod with ends of rod protected by plastic caps.
      a. Roller for end-mounted motor is supported by self-aligning bearings in brackets.
   5. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen that is connected to edge of screen by tabs to pull screen flat horizontally.

B. Electrically Operated Screens with Ceiling Closure, Motor-in-Roller, and Tab Tensioning: Units designed and fabricated for suspended mounting, with bottom of case entirely or partially open under screen compartment.
   1. Products: Subject to compliance with requirements, provide the following provide one of the following:
      a. Draper Inc. Ultimate Access V Electric Projection Screen, as basis of design.

b. Da-Lite Screen Company.
c. Stewart Filmscreen Corporation.

2. Projection Viewing Surface: TecVision XT900X ALR.
3. Configuration: See Drawings.
4. Extra Drop Length: As needed at top of screen for bottom of screen to be 36 inches (900 mm) above floor.
5. Provide metal or metal-lined wiring compartment.
6. Screen Case: Made from metal.
7. Provide screen case with trim flange to receive ceiling finish.
8. Finish on Exposed Surfaces: Manufacturer standard, Architect selected finish.

C. Accessories:
1. Trim Kit: Provide manufacturer standard ceiling opening trim kit when required for acoustical ceiling.

2.3 PERFORMANCE

A. Sustainable Performance: See Section 018113 for additional requirements.
1. Material Ingredients: Use materials with ingredients compliant with requirements.
2. Material Low VOC: Use materials tested for VOC levels compliant with requirements.
3. Material Sourcing: Source materials using sustainable methods compliant with requirements.
4. Material Recycling: Use materials containing recycled content compliant with requirements.
5. Local Materials: Use locally produced materials compliant with requirements.
6. Embodied Carbon: Use materials produced using sustainable practices compliant with requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough-in openings.

3.2 INSTALLATION

A. Install front-projection screens at locations indicated to comply with screen manufacturer written instructions.

B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.

a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.
3. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

3.3 PROTECTION

A. Protect installed products until Final Completion.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 118119

VACUUM CLEANING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Cleaning system for County vehicles adjacent to trash enclosure.

B. Principal Products:
   1. Bus vacuum system.

1.2 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.

1.3 WORK INCLUDED

A. Base Bid:
   1. General Contractor Provide/Manufacturer: One complete Bus Vacuum System with two remote hose reel, in accordance with the following technical specification.

B. Scope.
   1. Intent of these specifications and drawings is to establish quality and performance level for design, materials, durability, and workmanship of the Bus Vacuum System and components.
   2. Bidders must conform strictly to these specifications in their bid.
   3. The layout plans and details for Bus Vacuum System shown on drawings and specified herein were prepared for a system as manufactured by N/S Corporation 1-800-782-1582 /440-370-5056.
   4. General Contractor and Bus Vacuum System Manufacturer/ Supplier are responsible for providing electrical and mechanical coordination for complete and operable system.
   5. Bidder to indicate on Bid Proposal Form the Bus Vacuum System Manufacturer that will be used on the project.

1.4 RELATED SECTIONS

A. Division 15000 - Mechanical.

B. Division 16000 - Electrical.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is an authorized representative or employee of the Bus Vacuum System manufacturer for both the installation and maintenance of the type of equipment required for this Project.

B. Manufacturer Qualifications: Firm experienced in manufacturing for Bus Vacuum Systems with a minimum of 5 systems in operation to this specification and that have a record of successful in-service performance for five years or more.

C. Electrical Component Standard: Provide components that comply with NFPA 70 "National Electrical Code" and are listed and labeled by U.L.

D. Design concept: The Drawings indicate the size, profiles and dimensional requirements of each for Bus Vacuum System component and are based on the specific type and models indicated. Individual components by other manufacturers may be considered provided they meet the qualifications listed and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.6 SUBMITTALS

A. Product Data: Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is located on a single page.

B. Operation and Maintenance Manual:
   1. Provide: Complete parts, operating and maintenance manual covering equipment at time of installation including, but not limited to:
      a. Description of system and components.
      b. Layout drawings of piping and equipment locations specific to this project.
      c. Schematic diagrams of electrical, plumbing and compressed air systems.
      d. Manufacturer's printed operating instructions.
      e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventative maintenance is not a condition for validation of warranties.
      f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts service source.
   2. Assemble and provide copies of manual in 8 ½ by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements.

C. Shop Drawings: Submit Shop Drawings in accordance with Division 1 - General Requirements of these specifications.

1.7 PRODUCT SUBSTITUTIONS

A. Follow requirements specified in Division 1 -General Requirements.

B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.

C. Substitution Approval: 2 weeks prior to bid with (3) references, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.8 WARRANTY

A. Warrant work specified herein for one year from acceptance by Owner against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. Submit warranties in accordance with Division I -General Requirements of these specifications.

E. All parts must be readily available by the manufacture.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers appropriately packaged and/or crated for protection during domestic shipment and in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title of this specification.

C. Provide equipment with materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.10 LABELING

A. Manufacturer will securely attach in a prominent location on each major item of equipment a noncorrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.

B. All electrical equipment and materials shall be new and shall be listed by certified North American Underwriter (U.L, CSA or ETL) in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

1.11 CODES AND STANDARDS

A. All work and materials shall be in accordance with the requirements of all applicable local codes; ordinances, rules and regulations of all authorities have jurisdiction. Nothing on the drawings and specifications shall be construed to permit work not in conformance with these rules and regulations.

PART 2 PRODUCTS

2.1 VACUUM SYSTEM, TWO STATIONS

A. Acceptable Manufacturers.
   1. Prime Manufacturers: Subject to compliance with requirements, provide complete Bus Vacuum System with TWO remote hose reels by the following:
      a. N/S CORPERATION, as Basis-of-Design.
         1) Model: # SYS- ONE LANE -TWO HOSE WHEELS.
   2. Alternate manufactures: Contingent upon compliance with these specifications and documentation requirements set forth in QUALITY INSURANCE and SUBMITTALS, equipment produced by other manufactures may be considered as equal.

2.2 GENERAL DESCRIPTION

A. Operation: the system shall be a central vacuum system designed for coarse and fine cleaning of all types of transit vehicles, buses, vans, cars, and trucks. The system shall be capable of handling wet or dry refuse. The system shall be able to collect course refuse like mud, leaves, sand and wrappers, from grooved bus floors and drivers area while preventing fine dust from contaminating electrical or mechanical components. The system shall be capable of fine cleaning such areas as radio compartments, electronic destination sign area, wheelchair lifts, and fare boxes, etc. without causing damage to the components. The system shall be complete with one vacuum pump, coarse and fine filters, two remote controlled hose reels, automatic air valving, PVC vacuum piping and programmable logic controller type electrical system. The system shall have 2 inch cleaning lances complete with attachments at each workstation. The system shall be sized to handle the simultaneous cleaning operations of two (2) 2" cleaning lances and pneumatically transporting coarse and fine refuse to a central container. Bus cleaning system shall be capable of performing the cleaning operation within the normal five

(5) to eight (8) minute cleaning cycle time. The Contractor or manufacturer shall provide all material, equipment, labor, services and incidentals for a complete installation.

B. Capacities/Dimensions:
   1. Vacuum pump:
      a. Motor: 460 VAC, 3 phase, 20 HP.
      b. Maximum airflow: 480 CFM at 7.5" mercury (operating; not maximum).
      c. Inlet diameter: 5 inches, minimum.
      d. Maximum sound level: 80 dbA at 10 feet.
   2. Filter Separator:
      a. Efficiency: 99.93 percent at 1 micron.
      b. Area: 210 square feet, minimum.
   3. Hose reels:
      a. Motor: 460 VAC, 3 phase, ½ HP.
      b. Two inch hose length: 50 feet, minimum.

C. Major Components: Complete system shall include the following major components.
   1. Vacuum pump: The Centrifugal multi-stage vacuum pumps shall be 421A20 or approved equal. The vacuum pumps shall be (1) one 20 HP, producing 480 CFM at 7.5" inches of mercury, rated for 1,500 hours continuous duty between lubrication. The vacuum pump shall be of a fabricated welded construction housing, direct drive" outboard (4) four bearing" design where by the motor and the multi-stage pump shaft is joined by a flex coupling. Vacuum pumps having cast ends with tie rods holding the stages together and single stage high pressure fans or belt driven fans are not acceptable. The pump shall be equipped with an electronic surge control which automatically bleeds air into the system by way of a motorized butterfly damper controlled by a PLC programmable control panel. A motor thermal safety protector shall be incorporated at a maximum setting of 120ºC.
   2. Filter Unit: The filter unit shall be NSS30-2 or approved equal by A/E with all of the qualifications listed. The filter shall be a cyclone type filter and operate in two stages, primary filtration in the cyclone and secondary filtration with the cylindrical pleated polyester cartridge filter. The service life of the pleated polyester cartridge filter shall be a minimum of 12 months. The unit shall have a minimum of 140sq ft. area. The efficiency of the filter shall be 99.93% efficient to 1 micron DIN24184/3 with aerosol #3. the filters shall be capable of self-cleaning by compressed air, reverse pulse, automatically and manually. The separator will be complete with a 30gallon waist canister with bag equalizer. Canister to be complete with 50 waist sacks 3 mm.
   3. Piping and Fittings: Piping shall be galvanized carbon steel piping, joints, fittings, valves, coupling seals and adapter for the complete operable installation. Pipe diameter at the gross refuse pickup point shall be a minimum of 4 inches with 2 inches for fine cleaning. Minimum ducting diameter shall be 3.inch; all ducting size shall be detailed and indicate cleanout locations on the installation drawings. A minimum of 5500 FPM shall be maintained in the main duct lines to prevent any refuge settlement. Seals shall be rubber butt type. All joints, valves, couplings, adapters and fittings shall be leak-free.
   4. Work Stations: The one (1) bus lane shall be equipped with two hose reel work station, located at the front and the rear door of a typical transit bus. Final location to be approved by the representatives of the transit authority.
      a. The two (2) hose reel work station located at the front of a typical transit bus, shall

have one fifty (50) foot minimum 2 inch diameter type heavy-duty vacuum hose. The work station on the hose reel shall be remote controlled "IN" and "OUT" by a control unit mounted on the cleaning lance with a protective cover to prevent damage. The hose shall be mounted on a motorized hose reel VHR-P20 or approved equal by A/E, powered with a minimum 1/2 HP, 575 volt enclosed gear motor. The reel drum shall be of stainless steel welded to two (2) 16 gauge steel ends, with hose guides and complete with variable speed in and out not to exceed 25 RPM. A quick disconnect clean out shall be provided on the hose reel with a minimum opening of 2 1/2 inches. The hose reel shall be mounted on a tubular steel frame, located 8 feet above floor level, and positioned at the front of a typical 40 ft transit vehicle. The reel shall have a fifty (50) foot, minimum diameter 2-inch heavy-duty anti-static vacuum hose. Attachments shall include, 2 inch cleaning lance, 12" floor tool with adjustable wheels, 2" round utility tool, 2-inch flat suction nozzle, rectangle suction brush, crevice tool and a On-Off switch with auto shutdown after 15 min. of operator cleaning time. Final location of the reels to be coordinated with the Transit Authority.

b. The remote hose reel control stations shall be furnished with spring return START and STOP push-button and a green indicating run light for the Vacuum motor, hose reel UP-DOWN, push button selector switches. Push buttons, selector switches and indicator lights shall be heavy-duty industrial type or approved equal. The hose reel control station shall be rated NEMA 4/12.
c. Provide all conduit and wire from the vacuum system control panel to pumps and controls for a complete and operable package system.
d. An automatic gate valve will be mounted at each outlet of the hose reels to open/close access to vacuum airflow. The gate valve will be actuated by a micro switch mounted in the hose reel in/out control module.

5. Main Electrical Control Panel:
   a. Pre-wired, 460 volt, 3 phases, 60 Hertz NEMA 4/12 rated main electrical control panel containing motor starters for the vacuum pump motors, full voltage reversing starters for hose reel motors, step-down transformer for control circuits, and digital display for alarm, timing functions and a programmable logic controller (PLC). All timing, alarm and logic functions shall be performed by the PLC; electromechanical relays are not acceptable. PLC shall be heavy-duty industrial type and have a minimum 512 megabytes instruction memory and a flash card memory back up. The main control shall include touch screen operator interface screens. The operator screen enclosure shall display total run hours, run hours between service intervals and current system pressure level. Panel enclosure shall be equipped with a lockout/tag-out type disconnect switch. The panel cover shall include a positive action, red, emergency stop button with oversize head. A white pilot light to indicate power to panel. The panel shall be UL/ULC, CSA or ETL listed with approval labels.
   b. Circuit breakers shall protect all motors and the motor starter shall contain overload protection in all ungrounded conductors. Motor starters shall be NEMA Rated heavy-duty industrial types.
   c. A single CAD generated system wiring diagram showing all internal panel wiring, external wiring between components, wire sizes and colors and breaker rating and terminal designations shall be provided.
   d. Labeled terminal strips shall be provided for all external control wiring and shall

correspond to terminal numbers on the CAD system drawing. Nameplates shall be placard engraved lettering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to beginning installation, examine area to receive Bus Vacuum System. Verify that critical dimensions are correct and that conditions are acceptable.
   1. Do not proceed until unsatisfactory conditions have been corrected.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items listed.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect or designated representative.

B. General: Install Bus Vacuum System according with plans, shop drawings and to manufacturer's instructions.
   1. Set Bus Vacuum System securely and accurately in place; thumb, level and properly aligned. Anchor as required for secure operation.

C. Vacuum pump shall be installed on 4" housekeeping pad with a perimeter or 3" beyond final dimension of equipment.

D. Upon completion of work, finish surface shall be free of tool marks, scratches, blemishes and stains.

3.3 FIELD QUALITY CONTROL

A. Testing: After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specification in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.4 CLEANING

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, solvent and make ready for use.

C. Clean area around equipment installation and remove packing and installation debris from job site.

D. Notify Architect or designated representative for acceptance inspection.

3.5 TESTING

A. Testing: The system shall be considered acceptable if it can successfully clean a minimum of 15 buses without any failures. The manufacturer shall have a qualified representative present at site during the test period.

3.6 TRAINING

A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.
   1. Vacuum System single lane, 4 hours.

B. Obtain from technical representative, a list of Owner's personnel to be trained on the equipment operations and maintenance.

END OF SECTION

SECTION 118129

FACILITY FALL PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Horizontal lifeline systems.
2. Equipment tie backs.
3. Personal safety equipment.

1.2 PRICE AND PAYMENT PROCEDURES

1.3 ADMINISTRATIVE PROCEDURES

A. Coordination Procedures:
1. Coordinate Work results of this Section with structural steel and roofing.

B. Preinstallation Meeting and Attendees Procedures:
1. Conduct conference at Project site minimum one week prior to Commencement of the Work.
2. Additional Attendees:
a. Roofing Contractor.
b. Curtain wall inste.
3. Additional Agenda Items:
a. Installation conditions and roof warranty requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
1. Show all attachments and anchorage to building structure.
2. Show complete layout and configuration of fall protection components and accessories.
3. Indicate design and fabrication details, hardware, and installation details.

C. Delegated Design Submittal: Stamped and signed drawings and calculations.
1. When loads imposed and connection conditions do not exceed or differ from what is shown in structural Drawings, include letter stating the following:
a. "The system has been designed to impose loads on the primary structure that are

within the load limits and at the locations indicated on the structural Drawings."

2. When loads imposed and connection conditions exceed or differ from what is shown in the structural Drawings, submit loads imposed on the primary structural frame due to the design dead, live, wind, and seismic loads.
3. Show location, magnitude and direction of imposed loads, and unfactored load cases. Represent loads graphically on a copy of structural framing plans or elevations as appropriate. Detail connections at each location and note on the delegated design drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Certificates: Product certificates signed by manufacturer certifying materials follow specified performance requirements.

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

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Manufacturer approved or authorized.
   2. Testing Agencies: ASTM E548, and acceptable to authorities having jurisdiction.
   3. Licensed Professionals: Engineer specializing in design of fall protection assemblies, licensed in Florida.
   4. Welding Qualifications:
      a. Steel Fabrications: AWS D1.1.
      b. Aluminum Fabrications: AWS D1.2.
      c. Sheet Steel: AWS D1.3.
      d. Stainless Steel Fabrications: AWS D1.6.

PART 2 PRODUCTS

2.1 COMMON FALL PROTECTION SYSTEM MATERIALS AND ANCHORS

A. Manufacturers and Products:
   1. Pro-Bel.
   2. Evan Fall Protection.
   3. Honeywell.
   4. Tractel Swingstage Division.

B. Design Requirements:
   1. Drawings show design intent of the fall protection system. Design components and systems to permit access to building roof for maintenance operations.
   2. Determine actual quantities, layout, locations, and types of components and systems required.

3. Identify differences between design intent shown on Drawings and manufacturer design required to satisfy specified requirements.

C. Source Limitations: Obtain products specified in this section through one source from a single manufacturer.

D. Anchors:
1. Safety U-Bars: ASTM A276, Type 304 stainless steel, 35 ksi yield strength, minimum 3/4 inch diameter with 1-1/2 inch eye opening; type required for installation conditions to secure anchors to building structure.
2. HSS Hollow Steel Section Piers: Mild steel, Type 300W, minimum 50 ksi yield strength, hot dipped galvanized to ASTM A123.
3. Base Plates and Other Sections: Mild steel, Type 300W, minimum 44 ksi yield strength, hot dipped galvanized to ASTM A123; thickness, configuration and securement to suit application.
4. Flashing for Steel Pier Anchors: Seamless spun aluminum, ASTM B221, Type 6061-T6.
5. Miscellaneous Bolts, Nuts, and Washers: ASTM A276, Type 304 stainless steel, minimum 35 ksi yield strength.
6. Cables: Stainless steel continuous cables.

E. Safety Guard Rails:
1. Steel Tube: ASTM A500.
   a. Diameter: See Drawings and Shop Drawings.
2. Plates, Shapes, and Bars: ASTM A36.
3. Steel Cable: Stainless steel, Type 304, minimum; braided; thickness as indicated on Shop Drawings.
4. Fasteners: Type 304 stainless steel or hot-dip zinc-coated steel complying with ASTM A153 for zinc coating.
5. Galvanized Railings: Provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

2.2 DOUBLE LANYARD HORIZONTAL LIFELINE SYSTEM

A. Double Lanyard Horizontal Lifeline System: Permanent engineered horizontal lifeline with hands-free bypass capability, including cable, tensioners, anchors, and full-body harness with double lanyard, for fall arrest of workers during roof access and façade maintenance operations.
1. Manufacturers and Products:
   a. Pro-Bel.
   b. Evan Fall Protection.
   c. Honeywell.
   d. Tractel Swingstage Division.
2. Cable: 5/16 inch diameter, minimum, galvanized steel; 9,000 pounds breaking strength, minimum; permanently swaged cable ends.
3. Data Plate: Noncorrosive; install at cable system entry points; state maximum service capacity and number of users.
4. Tensioner: Stainless steel turnbuckle, ASTM A167, Type 316.
5. Harness: Manufacturer standard full body harness with double shock absorber lanyard.

2.3 PLATFORM INTERMITTENT STABILIZATION ANCHORS

A. Platform Stabilization Anchors: Intermittently spaced building façade anchors that engage suspended platform stabilizer ties to restrain platforms against wind sway and building contact during window washing and façade maintenance operations.
   1. Manufacturers and Products:
      a. Pro-Bel.
      b. Evan Fall Protection.
      c. Honeywell.
      d. Tractel Swingstage Division.
   2. Buttons: Stainless steel; 1-1/2 inch diameter by 3/16 inch thick; Allen-head recess; complete with threaded stainless steel building anchor insert; size and configuration to suit building façade.
      a. Pullout Force: Resist 600 pounds ultimate load, applied non-simultaneously parallel and perpendicular to building façade.
   3. Stabilizer Ties: Manufacturer standard; quantity to suit application.
   4. Spacing: Every third floor or 50 feet, whichever is less, in line with platform suspension points.

2.4 ROOF-RIGGED DAVITS

A. Roof-Rigged Davits: Portable, demountable aluminum davit system, including booms, masts, arms, and galvanized steel bases, for suspending and rigging maintenance platforms and lifelines at the building perimeter.
   1. Manufacturers and Products:
      a. Pro-Bel.
      b. Evan Fall Protection.
      c. Honeywell.
      d. Tractel Swingstage Division.
   2. Davit Booms: Portable aluminum I-beam sections; engineered length and size to suit application; carrying handles; 1,300 pounds vertical service load, minimum.
      a. Name Plate: Permanent, non-corroding; attach to each boom; include maximum service capacity, manufacturer name, serial number, and manufacturing date.
      b. Furnish two davits of each size and configuration required.
   3. Davit Masts: Round tubular aluminum; 360 degree rotation; carrying handles, connecting pins, erection winch, turning handles, and transport wheels.
   4. Davit Arms:
      a. Demountable: Break down to components weighing 80 pounds maximum.
      b. Transport for Components Over 80 Pounds: Provide means that keeps center of gravity 36 inches maximum above safe surface during transport.
      c. Hoisting: Provide mechanical means for components requiring more than 80 pounds lifting force.
      d. Trolley Stops: Provide on davit arm booms equipped with rolling or friction trolleys to prevent trolley detachment from boom.
      e. Tall Roof-Rigged Davits: Provide hoisting winches to raise and lower arms, and dolly wheels to roll davit arms into place.
   5. Davit Bases: Round hollow steel section piers, mild steel, ASTM A36, Type 350W; 50

ksi yield strength; hot-dip galvanized; 3/4 inch U-bar safety anchor.
   a. Anchor and Securement: To suit application.
   b. Davit Bases at Terraces: Recessed, flush with terrace surface; provide removable cap at top of base.
6. Tethers: Secure pins and loose pieces with 1/8 inch stainless steel cable.
7. Plates and Other Sections: Mild steel, Type 300W; 44 ksi yield strength, minimum; hot-dip galvanized; thickness, configuration, and securement to suit application.
8. Flashing for Steel Pier Anchors: Seamless spun aluminum, ASTM B221, Type 6061-T6.
9. Miscellaneous Bolts, Nuts, and Washers: Type 304 stainless steel; 35 ksi yield strength, minimum.

2.5 SUSTAINABILITY CHARACTERISTICS

2.6 PERFORMANCE

A. Delegated Design:
   1. Delegate facility fall protection system design to licensed fabricator Professional Engineer.
   2. Structural Performance: Provide fall protection system capable of withstanding design loads in according to requirements of authorities having jurisdiction and the following:
      a. ASCE7.
      b. Applicable requirements of OSHA Standards.
   3. Fall Arrest Safety Anchors: Design for 1,800 pounds arresting force for user wearing a body harness with a safety factor of 2 to 1 without any permanent deformation and to 5,000 pounds against fracture or detachment.
   4. Cable Safety Systems:
      a. Capacity: Two workers per cable subspan.
      b. Type: Permanent engineered horizontal lifeline with hands-free bypass capability.
      c. Truss Vertical Members: Design to support 5 kip vertical oad.
      d. Do not load truss vertical members horizontally.
      e. Do not load truss diagonal members vertically or horizontally.
   5. System Support: Design and provide structural steel stanchions, attachments, and framing required to support system-imposed loads not shown on Structural Drawings.

B. Window Cleaning Safety Requirements: Follow OSHA Standards paragraph 1910.66, ANSI A120.1, and manufacturer recommendations.

2.7 FINISHES, GENERAL

A. Follow NAAMM, 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.

2.8 STEEL FINISHES

A. Hot-Dip Galvanizing: ASTM A123, minimum 1.25 oz/sf galvanized coating.
   1. Galvanizing Touch Up Paint: SSPC Paint 20 zinc rich.

2.9 STAINLESS STEEL FINISHES

A. No.4 satin, or manufacturer standard finish for each application.

2.10 ALUMINUM FINISHES

A. Anodizing: AAMA 611 Class I or AAMA 612 with electrodeposition organic seal.
   1. Color: Architect selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements affecting performance of Work.

B. Verify supporting structure, embeds, and anchor locations are in place, correctly located, and capable of resisting design loads before installation.

3.2 INSTALLATION

A. Install fall protection systems plumb, level, and securely anchored per approved Shop Drawings, and delegated-design submittals.

B. Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction.

C. Field Welding:
   1. AWS D1.1, Structural Welding Code - Steel.
   2. AWS D1.2, Structural Welding Code - Aluminum.
   3. AWS D1.6, Structural Welding Code - Stainless Steel.

D. Corrosion Protection: Coat concealed surfaces in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Flashing and Sealing: Flash and seal roof and façade penetrations watertight; coordinate with roofing per NRCA recommendations.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Load Testing: Test anchors and lifeline systems to manufacturer- and engineer-specified proof loads; do not exceed design load. Verify no permanent deformation, fracture, or detachment.

C. Non-Conforming Work: Make corrections or replace, and re-test.

3.4 ADJUSTING AND CLEANING

A. Lubricate moving parts for smooth operation.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas; repair galvanizing per ASTM A780.

C. Remove protective coverings and clean exposed surfaces before Substantial Completion.

3.5 CLOSEOUT ACTIVITIES

A. Demonstration and Training: Train Owner personnel in safe use, inspection, and recertification requirements of the fall protection system.

END OF SECTION

SECTION 118226

FACILITY WASTE COMPACTORS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Waste removal equipment.

B. Principal Products:
   1. Facility waste compactors.
   2. Bin.
   3. Dumpsters.
   4. Waste caddy.

C. Related Requirements:
   1. Section 018113.23 "Sustainable Design Requirements - LEED v4.1 BD+C" for requirements affecting the Work of this Section.
   2. Section 113013 "Residential Appliances" for residential trash compactors.
   3. Section 114000 "Foodservice Equipment" for food-waste shredding, pulping, grinding, and compacting machines in foodservice facilities.
   4. Section 149182 "Trash Chutes" for waste chutes and diverters servicing waste compactors.
   5. Section 211000 "Water-Based Fire-Suppression Systems" for building fire sprinklers and piping connections to automatic sprinkler in hopper of each chute-fed compactor.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Inspect and discuss electrical, plumbing, and sprinkler roughing-in; equipment bases; and other preparatory work specified elsewhere.
   2. Review coordination of chute and diverter locations with waste compactors.
   3. Review sanitary requirements for water bibs, floor drains, and grease traps if required for Project to reduce decomposition and odors.
   4. Review haul routes of waste to the compactor, route of hauler's equipment, and protections along these routes that are specified elsewhere.
   5. Review required testing, inspection, and certification procedures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include rated capacities, operating characteristics, furnished specialties and accessories, and finishes.

B. Sustainable Design Submittals:
   1. LEED v4.1 Submittals: For all permanently installed products and materials related to the work of this Section, submit product and material documentation to comply with and contribute to the Project's LEED requirements, as outlined in the Submittals article of Section 018113.22 – Sustainable Design Requirements".

C. Shop Drawings: For each waste compactor and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and attachment details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Dimension chute and diverter locations that interface with waste compactors.
   4. Include location and installation details of automatic sprinkler in hopper of each chute-fed compactor.
   5. Indicate equipment access points and required space for equipment service and operation.
   6. Include setting drawings, templates, and instructions for installing anchor bolts and other anchorages.
   7. Include diagrams for power, signal, and control wiring.

D. Sustainable Design Submittals:
   1. LEED v4.1 Submittals: For all permanently installed products and materials related to the work of this Section, submit product and material documentation to comply with and contribute to the Project's LEED requirements, as outlined in the Submittals article of Section 018113.22 – Sustainable Design Requirements".

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of waste compactor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For waste compactors to include in operation and maintenance manuals.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date maintenance service is concluded. State

services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
   1. Maintenance Proximity: Not more than two hour(s') normal travel time from Installer's place of business to Project site.

B. Waste-Compactor Standards: ANSI Z245.21 including annexes and NFPA 82.

1.7 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of waste-compactor Installer. Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper waste-compactor operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 PRODUCTS

2.1 FACILITY WASTE COMPACTORS

A. Waste Compactor: Manufacturer standard compactor with chute fed hopper, and with components, options, and accessories needed to provide a complete, functional system.
   1. Manufacturers and Products:
      a. Wilkinson Hi-Rise: 400C5, as basis-of-design.
      b. Chutes Inc.
      c. Wilkinson.
      d. Or approved equal.
   2. Capacity per Hour: 54 cu. yd.
   3. Cycle Time: 60 seconds maximum.
   4. Motor Size: 5 hp.
   5. Controls: Programmable Logic control (PLC).
   6. Finish: Manufacturer standard.
      a. Color: Architect selected from manufacturer full range.

B. Storage Container: Manufacturer standard type designed to fit compactor, 2.0 cubic yard minimum capacity.
   1. Manufacturers and Products:
      a. Wilkinson Hi-Rise: Twin Hopper Container Hold Down System, as basis-of-design.
      b. Or approved equal.

C. Discharge Container:
   1. Provide two yard waste caddy dumpsters for each midrise building and two yard front load pickup dumpsters per buildings. Include all necessary connection hardware.
   2. Provide two cubic yards waste caddy dumpsters at trash corals for lowrise building as shown on site plans.
   3. Coordinate container volume capacity, weight capacity, and pickup points with township's standard requirements.
   4. Type: Manufacturer standard of fabricated steel, enamel finish.
   5. Transport Mechanism: Steel wheels; fixed and on casters.

D. Number of Extra Storage Containers: Two.

2.2 WASTE CADDY

A. Waste Caddy: Battery powered system; tow pulls garbage dumpster 5,000 lbs. maximum.
   1. Manufacturers and Products:
      a. DJ Products, Inc. Waste Caddy Dumpster Tow, as basis-of-design.
      b. Or approved equal.
   2. Battery System: 3-36 volts with charger works with 120/220 Hz outlets.

2.3 FABRICATION

A. Fabricate waste compactors with smooth, eased, exposed edges to prevent injury to persons in vicinity of the equipment.

B. Fabricate containers, hoppers, compaction chambers, unit bodies, and similar components of steel with welded joints. Reinforce with steel members sized and spaced to withstand impacts and pressures of normal operations and to prevent deformation.

C. Fabricate equipment with replaceable parts at points of normal wear.

D. Fabricate liquidtight compactor baffles to stop liquid from leaking out.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, clearances, service rough-ins, and other conditions

affecting performance of the Work.

B. Examine walls, floors, and chutes for suitable conditions where each waste compactor will be installed.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION OF FACILITY WASTE COMPACTORS

A. Install each waste compactor according to manufacturer's written instructions, ANSI Z245.2, and ANSI Z245.21, including appendices.

B. Install automatic sprinkler in hopper of each chute-fed compactor according to NFPA 82.

C. Set waste compactors level, plumb, properly aligned, and securely in place. Anchor as required for secure operation.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Manufacturer Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:
   1. Perform installation and startup checks according to ANSI Z245.21, Appendix D, "Tests for Evaluation of Equipment and Performance," and manufacturer's written instructions.
   2. Test and adjust controls, alarms, and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Verify unrestricted access to each firefighting access door or hose connection required by ANSI Z245.21 and NFPA 82 for compactor container(s).
   4. Verify correct locations, color coding, and legibility of caution, warning, and danger markings.
   5. Certify compliance with test parameters.

C. A waste compactor will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, initial maintenance service shall include 12 months' full maintenance by skilled employees of waste-compactor Installer.

Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper waste-compactor operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain waste compactors according to manufacturer's written instructions and ANSI Z245.2.

END OF SECTION

SECTION 122413

ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Motorized roller window shades.
2. Motorized roller window shades, acoustic.
3. Manual roller window shades.

B. Principal Products:
1. Roller window shades.
2. Shade materials.
3. Motorized operator.
4. Manual operator.
5. Installation accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate power wiring for motorized units.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Each roller shade type.
2. Initial selection color charts and samples for shadeband fabric and metal finish.

B. Shop Drawings: Show shades on floor plans or reflected ceiling plans.
1. Each installation area; include anchorage details.
2. Locations of control stations and units included in control zones.

C. Schedules:
1. Types by location. Include operation and appearance attributes.

D. Samples:
   1. Shadeband Fabrics: 8 by 8 inch Samples of each type.
   2. Fascia: 8 inch Samples in required colors.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: installer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include full parts list; shadeband fabric cleaning precautions.

B. Warranty documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Manufacturer recommended parts and quantities.

B. Extra Stock Materials:
   1. Full sized operable units equal to: Five (5) percent of installed materials, but not less than two (2) units.

C. Tools: Manufacturer recommended special tools required to maintain shade systems.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: Manufacturer authorized or trained.

B. Field Samples: Install roller shades for one individual window and one group of two or more windows with continuous shades in locations acceptable to Architect.
   1. Approved samples establish work results standard.

C. Mockups: Install roller shades in office mockup specified in Section 014000 - Quality Requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store roller shades inside building after enclosure.
   2. Mark packaging with installation location using Drawing room designations.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.10 WARRANTY

A. Manufacturer Warranties:
   1. Warrant against product failure.
      a. Hardware: Ten years.
      b. Shade Fabric: 25 years.
      c. Motor Operators and Controls: 5 years.

PART 2 PRODUCTS

2.1 MANUAL OPERATION SHADES

A. Manually Operated Roller Shades:
   1. Manufacturers and Products:
      a. MechoShade Mecho /5.
      b. Or approved equal.
   2. Shade Type: Single roller.
   3. Shade Type: Double roller.
   4. Drop Position: See Drawings.
   5. Mounting: See Drawings.
   6. Shade Fabric Attachment: Replaceable without disassembly.
   7. Hembars: Maintain bottom edges straight and flat.
      a. Style: Architect selected.
   8. Clutch Operator: Permanently lubricated, continuous loop chain operation.
      a. Universal Cord Tensioning Device: ANSI/WCMA A100.1.
      b. Reduced Operating Force: 8.5 pounds, maximum.

B. Accessories:
   1. Fascia: Extruded aluminum; conceals shade mounting and roller without exposed fasteners.
      a. Finish: Powder coat, Architect selected color.
   2. Ceiling Recess: Enclosure for mounting in suspended acoustical ceiling.
   3. Room Darkening Channels: Extruded aluminum with brush pile edge seals.

2.2 MOTOR OPERATION SHADES

A. Motorized Roller Shades: ANSI/WCMA A100.1.
   1. Manufacturers and Products:
      a. MechoShade ElectroShade.
      b. Or approved equal.
   2. Shade Type: Single roller.
   3. Shade Type: Double roller.
   4. Drop Position: Regular roll.
   5. Mounting: See Drawings.
   6. Shade Fabric Attachment: Replaceable without disassembly.
   7. Hembars: Maintain bottom edges straight and flat.
      a. Style: Wrapped.

B. Motor Operator: NFPA 70 compliant, UL listed.
   1. Voltage: 120 VAC.
   2. Limit Switches: Adjustable.
   3. Controls:
      a. Single Roller Stations: Momentary contact open, close, and three programmable intermediate stop positions.
      b. Double Roller Stations: Momentary contact open, close, and three programmable intermediate stop positions each for inner and outer roller shades.
      c. Timer Control: Automatic operation of shades per programmable timer.
      d. Network Control: Computerized control for all shades in each room.
      e. Sun Sensor Control: Automatic operation of shades activated by sunlight intensity levels.

C. Accessories:
   1. Fascia: Extruded aluminum; conceals shade mounting and roller without exposed fasteners.
      a. Finish: Powder coat, Architect selected color.
   2. Ceiling Recess: Enclosure for mounting in suspended acoustical ceiling.
   3. Room Darkening Channels: Extruded aluminum with brush pile edge seals.

2.3 SHADE FABRIC

A. Shade Fabric: Colorfast, impervious to heat and moisture, and able to retain shape under exposure to sunlight through windows; NFPA 701 and ANSI/WCMA A100.1.
   1. Manufacturers and Products: See Finish Legend on Drawings.
   2. Mold Resistance: No growth per ASTM G21 results for fungi ATCC9642, ATCC9644, and ATCC9645.
   3. Fire Test Response Characteristics: Passes NFPA 701 small and large scale vertical burn tests.
   4. Solar Control Shade Fabric:
      a. Openness: Architect selected percent.
      b. Weave Pattern: Basket weave.
      c. Color: Architect selected.

2.4 PERFORMANCE

A. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design, ICC/ANSI A117.1, and state accessibility code.

B. Acoustic Performance:
   1. Motorized Units:
      a. Sound Pressure Level: 44 dBA, maximum, measured 3 feet from drive unit.
      b. No audible clicks when motor starts and stops.

2.5 FABRICATION

A. Height: Fill openings from head to within 1/2 inch of stool.

B. Width, Between Jambs: Uniform 1/4 inch gaps.

C. Continuous Windows With Separate Rollers: Butt rollers end to end centered on window mullions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify concealed support locations for attachment.

3.2 INSTALLATION

A. Install roller shades level, aligned with adjacent units, and centered on openings.

B. Install jamb guides plumb and aligned with shadeband drop.

C. Blackout Shades: Install 2 inches minimum from window glass surface.

D. Motor Operated Units:
   1. Provide control wiring.
   2. Connect operators to power wiring.
   3. Adjust limit switches for uniform closure and intermediate stops.

3.3 CLEANING

A. Clean metal and fabric surfaces.

3.4 CLOSEOUT ACTIVITIES

A. Demonstration: Train Owner staff on operation and maintenance.

END OF SECTION

SECTION 123216

MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Modular plastic-laminate-faced cabinets of stock design.

B. Principal Products:
   1. Plastic-laminate-clad casework.

C. Related Sections:
   1. Section 123661.16 Solid Surfacing Countertops.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated. with.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting at Project Site one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

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

B. Sustainable Design Submittals:
   1. Sustainable Design Submittals:
      a. LEED v4.1 Submittals: For all permanently installed products and materials related to the work of this Section, submit product and material documentation to comply with and contribute to the Project’s LEED requirements, as outlined in the Submittals article of Section 018113.22 – Sustainable Design Requirements".

C. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details,

including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.

D. Keying Schedules: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.

E. Samples for Verification:
   1. 8-by-10-inch Samples for each type of finish and the following:
      a. One full-size finished base cabinet complete with hardware, doors, and drawers.
      b. One full-size finished wall cabinet complete with hardware, doors, and adjustable shelves.
      c. Maintain full-size Samples at Project site during construction in an undisturbed condition as a standard for judging the completed Work.
         1) Undamaged samples may be incorporated into the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers: A manufacturer that specializes in manufacturing modular plastic laminate casework with a minimum five years documented experience.
   2. Installers: An installer that specializes in performing work on modular plastic laminate casework with a minimum five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Maintain casework where HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
   2. Established Dimensions: Establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at sites.
   3. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period. Failure includes:
      a. Delamination of components or other failures of glue bond.
      b. Warping of components.
      c. Failure of operating hardware.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers and Products: See Finish Schedule on Drawings.

B. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

A. Product Designations: Provide casework in sizes, configurations, and finish materials as shown on Drawings.

B. Directional Pattern: As directed by Architect.

2.3 PLASTIC LAMINATED FACED CABINETS

A. Design: See Drawings.

B. Exposed Materials.
   1. Plastic Laminate: Grade HGS.
      a. Colors and Pattern: See Finish Schedule on Drawings.

C. Semiexposed Materials.
   1. Plastic Laminate: Grade VGS.
   2. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.
      a. Colors and Patterns: As selected by Architect from manufacturer's full range.
      b. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
   3. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.

D. Concealed Materials.
   1. Solid Wood: With no defects affecting strength or utility.

2. Plastic Laminate: Grade BKL.
3. Particleboard.
4. MDF.

2.4 MATERIALS

A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

B. Softwood Plywood: DOC PS 1.

C. Particleboard: ANSI A208.1, Grade M-2.

D. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade M-2, except for density.

E. MDF: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.

F. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
   1. Manufacturers: See Finish Legend on Drawings.

G. Edgebanding for Plastic Laminate: Rigid PVC extrusions, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

2.5 FABRICATION

A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
   1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semiexposed surfaces.
      a. Shelves: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semiexposed surfaces.
      b. Drawer Fronts: 3/4-inch particleboard, faced.
      c. Drawer Sides and Backs: 1/2-inch thermoset decorative panels, with glued dovetail or multiple-dowel joints.
      d. Drawer Bottoms: 1/4-inch thermoset decorative panels glued and dadoed into front, back, and sides of drawers. Use 1/2-inch material for drawers more than 24 inches wide.
      e. Doors: 3/4-inch particleboard or MDF, plastic-laminate faced.

B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.6 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.
   1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Frameless Concealed Hinges, European Type: BHMA A156.9, Type B01602.
   1. Opening Type: 135 degrees of opening, self-closing.
   2. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.

C. Pulls: Solid wire pulls of materials shown on Drawings, fastened from back with two screws. Provide two pulls for drawers more than 24 inches wide.

D. Drawer Slides: BHMA A156.9, Type B05091.
   1. Standard Duty (Grades 1, 2, and 3): Side mounted and extending under bottom edge of drawer; full -extension type; zinc-plated steel with polymer rollers.
   2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated, steel ball-bearing slides.

E. Drawer and Hinged Door Locks: Cylindrical (cam) type, five-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.
   1. Provide a minimum of two keys per lock and six master keys.

F. Adjustable Shelf Supports: Single-pin metal shelf rests complying with BHMA A156.9, Type B04013.

PART 3 EXECUTION

3.1 INSTALLATION

A. Follow ANSI/AWI 0620.

B. Grade: Install cabinets to comply with same grade as item to be installed.

C. Install casework level, plumb, and true; shim as required. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

D. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.

E. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Align similar adjoining doors to a tolerance of 1/16 inch.

F. Install hardware uniformly and precisely. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

H. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

3.2 ADJUSTING

A. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Space standards not more than 30 inches o.c.

END OF SECTION

SECTION 123600

COUNTERTOPS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
   1. Countertops and integral sinks.

B. Principal Products:
   1. Plastic laminate countertops (PL1, PL2 and PL3).
   2. Solid-surface countertops (SSM1 and SSM2).
   3. Solid-surface sink bowls (SSM5).

C. Related Requirements:
   1. Section 064116 "Plastic-Laminate-Clad Architectural Cabinets".
   2. Section 224000 "Plumbing Fixtures and Equipment Installation" for integrated sinks and plumbing fittings.

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. HPDL: High Pressure Decorative Laminate.

B. Definitions:
   1. Sheen Levels: ASTM D523.
      a. Flat: Five gloss units at 60 degrees and 10 gloss units at 85 degrees, maximum.
      b. Satin: 20 to 35 gloss units at 60 degrees and 35 gloss units, minimum at 85 degrees.
      c. Semigloss: 35 to 70 gloss units at 60 degrees.
      d. Gloss: 70 gloss units at 60 degrees, minimum.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate locations of utilities and accessories penetrating countertops.
   2. Coordinate sizes and layouts with base cabinets.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one month, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Submittals, General: AWI 100.

B. Product Data:
   1. Countertop materials.
   2. Adhesives.
   3. Initial selection color charts.

C. Shop Drawings:
   1. Dimensioned plans and elevations showing countertop locations.
   2. Show materials, profiles, assembly methods, joint details, fastening methods, hardware locations, and cutout sizes and locations.

D. Samples:
   1. Plastic Laminates: 2 by 3 inches, minimum.
   2. Countertop Material: 6 inches square.
   3. Grommets: Each type and color.

1.5 INFORMATIONAL SUBMITTALS

A. Woodworker Quality Certificates: AWI Quality Certification Program.

B. Test and Evaluation Reports: Independent testing agency test results showing:
   1. Performance of fire-retardant-treated wood.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For stone countertops.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Fabricator: AWI Quality Certification Program participant.
   2. Installer: Woodwork fabricator and AWI Quality Certification Program participant.

B. Field Samples: Construct a representative sample of the front edge profile, built-up thickness, and an attached section of the back-splash or end-splash, 8' wide by 10" deep, minimum size. Demonstrate color and joinery.
   1. Approved Samples establish Work results standard.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: AWI 200.

B. Storage and Handling Requirements: NAAWS.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform Work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 COUNTERTOP GENERAL REQUIREMENTS

A. Quality Standard: ANSI/AWI 1236 for aesthetic grades and performance.

B. Aesthetic Grade: Custom.

2.2 PLASTIC LAMINATE COUNTERTOPS

A. HPDL Countertops: ISO 4586-3.
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
      a. Wilsonart, as Basis-of-Design.
      b. Or approved equal.
   2. Solid Surface Applications:
      a. Admin Building:
         1) PL1.
         2) PL2.
         3) PL3.
      b. Maintenance Building:
         1) PL1.
         2) PL2.
   3. Grade: HGS.
   4. Grain and Pattern Direction: Parallel to countertop length.
   5. Core Material: Exterior grade veneer core plywood.
   6. Edge Treatment: 3 mm PVC.
   7. Backer Sheet: HPDL; fabricator standard grade.

B. Installation Materials:
   1. Adhesives: Laminate manufacturer recommended, VOC compliant.

2. Fasteners: Type, size, and material to suit each application.

2.3 SOLID SURFACE COUNTERTOPS

A. Solid Surface Countertops: ISFA 2-01, homogeneous resin sheets.
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
      a. Dupont Corian, as Basis-of-Design.
      b. Or approved equal.
   2. Solid Surface Applications:
      a. Admin Building:
         1) SSM1.
         2) SSM2.
      b. Maintenance Building:
         1) SSM1.
         2) SSM2.

B. FABRICATION.
   1. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
      a. Grade: Custom.
   2. Configuration:
      a. Front: 3/4-inch bullnose.
      b. Backsplash: Straight, slightly eased at corner.
   3. Countertops:
      a. 1/2-inch- or 3/4-inch- thick, solid surface material with front edge built up with same material.
   4. Backsplashes: 3/4-inch- thick, solid surface material.
   5. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
      a. Fabricate with loose backsplashes for field assembly.
      b. Install integral sink bowls in countertops in the shop.
   6. Joints:
      a. Fabricate countertops without joints.
   7. Cutouts and Holes:
      a. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
         1) Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
      b. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
      c. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

C. Installation Materials:
   1. Adhesives: Countertop fabricator recommended, VOC compliant.
   2. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

3. Fasteners: Type, size, and material to suit each application.

2.4 SOLID SURFACE INTEGRAL SINK

A. Solid Surface Sink, SSM5: ISFA 2-01, homogeneous resin sheets.
   1. Manufacturers and Products: See Finish Legend on Finish Plan Drawings.
      a. Dupont Corian, Solid Surface, Neat Collection, 859 Sink, as Basis-of-Design.
      b. Or approved equal.
   2. Provide 100% acrylic solid surface integral sinks where indicated on Drawings.
   3. Type: Single-bowl lavatory with overflow.
   4. Color: Glacier White to match adjacent countertop material.
   5. Mounting Style: Hard-seam submount for a seamless, flush installation with the deck.

2.5 COUNTERTOP HARDWARE

A. Grommets: Plastic spring loaded cover and outer ring.
   1. Color: Architect selected.

B. Countertop Supports: Extruded aluminum Concealed T brackets, L shaped configuration.
   1. Manufacturers and Products:
      a. Rakks.
   2. Finish: Mill.

2.6 MATERIALS

A. Fire-Retardant-Treated Wood:
   1. Chemically treated and pressure impregnated.
   2. Flame Spread: 25, maximum per ASTM E84.
   3. Label or otherwise identify fire-retardant-treated material.
   4. Deliver fire-retardant-treated materials cut to required sizes. Minimize field cutting.

2.7 FABRICATION

A. Shop assemble Work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

C. Fabrication Tolerances:
   1. Wood Based and Solid Surface Countertops: ANSI/AWI 0620, specified grade.
   2. Wood Based and Solid Surface Countertops: Woodwork Institute NAAWS, specified grade.

D. Finish exposed edges of countertops and back and end splashes.

E. Stone and Quartz Agglomerate Countertop Fabrication: Natural Stone Institute Dimension Stone Design Manual.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of countertop supporting blocking and brackets.

B. Verify utility rough-in locations and sizes.

3.2 PREPARATION

A. Surface Preparation: Follow ANSI/AWI 0620.

B. Surface Preparation: Follow Woodwork Institute NAAWS.

C. Conditioning:
1. Acclimate products to installation environment per AWI 200 and ANSI/AWI 0620.
2. Acclimate products to installation environment per Woodwork Institute NAAWS.

3.3 INSTALLATION, PLASTIC LAMINATE COUNTERTOPS

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. 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.
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 countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
   2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c.
   3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.4 INSTALLATION, SOLID SURFACE COUNTERTOPS

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. 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 manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

D. 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 where indicated. 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.

E. Install backsplashes splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

F. 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.

3.5 INSTALLATION, INTEGRAL SINK

A. Seamless Integration:
   1. Pre-fit the Corian Neat 859 sink shape to ensure proper flush alignment with the deck cutout prior to applying adhesive.
   2. Clean all bonding surfaces thoroughly with clear, denatured alcohol before seaming.

3. Adhere the sink to the underside of the countertop using manufacturer's color-matched Corian Joint Adhesive to create a monolithic, inconspicuous "hard" seam.

B. Finishing:
1. Allow adhesive to cure fully per manufacturer's instructions before machining or sanding.
2. Rout and sand the inside edge of the cutout transition to create a completely flush, smooth, and seamless radius edge between the deck and the bowl.
3. Finish the inside profile and joint area to match the specified sheen of the adjacent countertop deck.

C. Coordination:
1. Coordinate cutout locations with plumbing rough-ins specified under Division 22.

3.6 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Inspections provided through AWI Quality Certification Program. Program inspectors will perform installation inspection and prepare reports. Allow inspectors access to Work areas.
1. Failed Test Retest Cost: Contractor responsibility.

B. Field Tests and Inspections: Inspections provided through WI Certified Compliance Program. Program inspectors will perform installation inspection and prepare reports. Allow inspectors access to Work areas.
1. Failed Test Retest Cost: Contractor responsibility.

C. Non Conforming Work: Remove and replace, and retest.

3.7 CLEANING

A. Clean countertops and splashes; remove excess sealant from adjacent surfaces.

3.8 PROTECTION

A. Protect countertops from soil and damage during remainder of construction.

END OF SECTION

SECTION 133419

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. New pre-engineered metal buildings, consisting of steel superstructure, roof assembly, and exterior wall assemblies with doors and windows, mounted on concrete pad.
2. Project Buildings to include:
   a. 01 - Admin Building.
   b. 02 - Maintenance Building.
   c. 03 - Transfer Center.
   d. 04 - Bus Wash.
   e. 05 - Fuel Station Building.

B. Principal Products:
1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Thermal insulation, including OSHA-compliant through fall protection liner system for roof.
6. Wall sheathing.
7. Exterior personnel doors and frames.
8. Overhead coiling doors.
9. Aluminum-framed entrances and storefronts.
10. Glazed aluminum curtain walls.
11. Exterior personnel doors and frames.
12. Skylights.
13. Accessories.

C. Related Requirements:
1. Section 051200 - " Structural Steel Framing".
2. Section 052100 - "Steel Joist Framing".
3. Section 053000 - "Metal Decking".
4. Section 054000 - Cold-Formed Metal Framing".
5. Section - 0742000 - Unit Masonry.
6. Section 074213 - Metal Wall Panels.
7. Section 079200 - "Joint Sealants" to prevent the penetration of water, air, moisture, dust, and contaminants while accommodating structural movement due to thermal expansion/contraction.
8. Section 081113 - "Hollow Metal Doors and Frames" for interior personnel doors and

frames.

9. Section 083323 - "Overhead Coiling Doors".
10. Section 084113 - "Aluminum-Framed Entrances and Storefronts."
11. Section 084413 - "Glazed Aluminum Curtan Walls".
12. Section 087100 - "Door Hardware" for hardware at interior personnel doors.

1.2 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Division 03 - Concrete.

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

C. Coordinate metal building door openings with overhead coiling doors and hollow metal personnel doors specified in other sections.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to metal building systems including, but not limited to, the following:
      a. Condition of foundations and other preparatory work performed by other trades.
      b. Structural load limitations.
      c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
      d. Required tests, inspections, and certifications.
      e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
   2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
      a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
      b. Structural limitations of purlins and rafters during and after roofing.
      c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and conditions of other construction that will affect metal roof panels.
      d. Temporary protection requirements for metal roof panel assembly during and after installation.

e. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
   a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
   b. Structural limitations of girts and columns during and after wall panel installation.
   c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
   d. Wall sheathing, weather barrier, continuous rigid insulation, and wall panel support system.
   e. Temporary protection requirements for metal wall panel assembly during and after installation.
   f. Wall observation and repair after metal wall panel installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Metal roof panels.
      b. Metal wall panels.
      c. Metal soffit panels.
      d. Thermal blanket insulation, vapor-retarder facings, vapor retarder fall-protective liner, and retainer strips.
      e. Wall sheathing.
      f. Exterior personnel doors and frames.
      g. Single-hung windows.
      h. Translucent roof panels.
      i. Louvers.
      j. Accessories.

B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
   1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
   2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
   3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
      a. Show roof-mounted items including exhaust fan roof vent penetration, mechanical equipment and lighting.
      b. Show roof insulation system details, including purlin locations, liner system retainer

strap locations and spacings, fastening points, fabric sizes and locations; insulation widths and thicknesses, typical seams sizes and locations and detailed installation instructions for quality assurance and OSHA through fall protection compliance.

c. Show wall construction, including batt insulation, sheathing, weather barrier, continuous rigid insulation, cladding support systems, and wall panels.
d. Show wall-mounted items including personnel doors, coiling doors, frame details for support of doors, and lighting fixtures.
e. Show translucent panels.
f. Show soffit panels and supports.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
   a. Flashing and trim.
   b. Show coordination with hanging gutters.
   c. Gutters.
   d. Downspouts.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For the following products:
1. Panels (Wall and Roof): Nominal 12 inches long by actual panel width. Include fasteners, closures, and exposed panel accessories.
2. Metal Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
3. Roof Insulation System Fall Protective Vapor-Retarder Liner: Nominal 12-inch-square fabric and 12-inch long retainer strap Samples.
4. Wall Insulation Batt Vapor-Retarder Facing: Nominal 6-inch-square Samples.
5. Windows: Full-size, nominal 12-inch-long frame Samples showing typical profile.
6. Accessories: Nominal 12-inch-long Samples for each type of accessory.

E. Door Schedule: For exterior doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.
1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

F. Delegated-Design Submittal: For metal building systems.
1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector and manufacturer.

B. Welding certificates.

C. Letter of Design Certification: Signed and sealed by a qualified structural engineer. Include the following:
   1. Name and location of Project.
   2. Order number.
   3. Name of manufacturer.
   4. Name of Contractor.
   5. Building dimensions including width, length, height, and roof slope.
   6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
   7. Governing building code and year of edition.
   8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
   9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
   10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

D. Erector Certificates: For qualified erector, from manufacturer.

E. Material Test Reports: For each of the following products:
   1. Structural steel including chemical and physical properties.
   2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   3. Tension-control, high-strength, bolt-nut-washer assemblies.
   4. Shop primers.
   5. Nonshrink grout.

F. Source quality-control reports.

G. Field quality-control reports.

H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

I. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.
   1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems".
   2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
   1. Erector shall be accredited under the International Accreditation Service, Accreditation Criteria for Inspection Practices of Metal Building Assemblers (AC478).

C. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
   2. AWS D1.3, "Structural Welding Code - Sheet Steel".

D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, 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.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty on Exterior Metal Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

B. Special Weathertightness Warranty for Standing-Seam Metal Roof: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

B. Manufacturers:
   1. Metallic Building Systems, as Basis-of-Design.
   2. American Building Company.
   3. Armstrong Steel Buildings.
   4. Butler Manufacturing Co.
   5. CECO Building Systems.
   6. Kemco Metal Buildings.
   7. Lester Building Systems.
   8. Nucor Metal Building Systems.
   9. Trachte Building Systems, Inc.
   10. Varco-Pruden Buildings.

2.2 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
   1. Incorporate building components specified in other sections into the integrated metal building system.

B. Primary-Frame Type:
   1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
   1. Maximum Girt Spacing: 24 inches o.c.

E. Eave Height: As indicated on Drawings.

F. Bay Spacing: As indicated on Drawings.

G. Roof Slope: As indicated on Drawings.

H. Roof System: Standing-seam, vertical-rib, metal roof panels with concealed fasteners.

I. Exterior Wall System: Exposed-fastener, corrugated metal wall panels.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 - Quality Requirements, to design metal building system.
   1. Include analysis of wall panel attachment through continuous rigid insulation and subframing support system.

B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual".
   1. Design Loads: As indicated on Drawings.
   2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings".

C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. 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: 120 deg F, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's

"Approval Guide," or from the listings of another qualified testing agency.

F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.

G. Fire-Rated Door Assemblies: 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.
   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.

H. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
   1. Wind Loads: As indicated on Drawings.

I. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft.

J. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft.

K. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft.

L. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft.

M. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 90.

2.4 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings".

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts".

C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
   1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
      a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
   2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
   3. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
   4. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
   5. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

E. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
   1. Purlins and Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
      a. Depth: As needed to comply with system performance requirements.
      b. Minimum Average Roof Purlin Spacing: 52 inches.
   2. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
   3. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
   4. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
   5. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
   6. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
   7. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
   8. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

F. Bracing: Provide adjustable wind bracing using any method as follows:
   1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade 50; or ASTM A529/A529M, Grade 50; minimum 1/2-inch-diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
   2. Cable: ASTM A475, minimum 1/4-inch-diameter, extra-high-strength grade, Class B,

zinc-coated, seven-strand steel; with threaded end anchors.

3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. Diaphragm Action of Metal Roof Panels: Design metal building to resist wind forces through diaphragm action of metal roof panels. Do not use diaphragm action of metal wall panels.

G. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

H. Materials:
1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.
    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
    b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, SS, Grade 50 or 80; with Class AZ50 coating.
9. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts]; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
10. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1 hardened carbon-steel washers.
    a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
11. Headed Anchor Rods: ASTM F1554, Grade 36.
    a. Configuration: Straight.
    b. Nuts: ASTM A563 heavy-hex carbon steel.

c. Plate Washers: ASTM A36/A36M carbon steel.
d. Washers: ASTM F436 hardened carbon steel.
e. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

12. Threaded Rods: ASTM A572/A572M, Grade 50.
    a. Nuts: ASTM A563 heavy-hex carbon steel.
    b. Washers: ASTM F436 ASTM A36/A36M carbon steel.
    c. Finish: Plain.

I. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.
    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

2.5 METAL ROOF PANELS

A. As specified in Section 074113 "Metal Roof Panels".

2.6 METAL WALL PANELS

A. As specified in Section 074213 "Metal Wall Panels".

2.7 SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Concealed-Fastener, Flush-Profile, Metal Soffit Panels: Formed with vertical panel edges and a flush surface; with flush joint between panels; with 1-inch-wide flange for attaching interior finish; designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    a. Exterior Finish: Fluoropolymer.
    b. Color: As selected by Architect from manufacturer's full range.
2. Panel Coverage: 16 inches.
3. Panel Height: 1 inch.

2.8 THERMAL INSULATION

A. Insulation in Roof Assemblies, at RT1 assembly: Double layer insulation blankets and liner system (LS) with thermal spacer blocks, per ANSI/ASHRAE/IESNA 90.1 Appendix A (2019), section A2.3.2.4.
   1. Manufacturers/Suppliers:
      a. Thermal Design, Inc.
      b. Therm-All.
      c. Bay Insulation Systems.
      d. Or approved equal.
   2. Liner System:
      a. System to provide OSHA compliant "through fall" protection (29 CFR-1926.501, 1926.760).
      b. Retainer Straps: 1-inch wide, minimum 0.025-inch minimum nominal-thickness, formed, metallic-coated ASTM C653 G rade 50 steel bands with exposed finish matching liner color. Provide fasteners or clips with matching finish.
      c. Liner: Manufacturer's recommended continuous reinforced vapor-retarding membrane, uninterrupted by secondary framing.
         1) ASTM C1136, with permeance not greater than 0.02 perm when tested according to ASTM E96/E96M, Desiccant Method.
         2) UL 723 or ASTM E84 flame spread classification of 25 or less and smoke developed index less than 50.
         3) Exposed Color: White.
   3. Unfaced Metal Building Insulation for Roofs: ASTM C991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density. UL flame spread classification of 25 or less and smoke developed index less than 50.
      a. Bottom Layer: Continuous R19 batts between purlins.
      b. Top Layer: Continuous R11 batts perpendicular to and over purlins.
   4. Thermal Spacer Blocks: Specified under "Roof Panel Accessories" below.

B. Insulation in Wall Assemblies, at WT1 and WT2 assemblies: Single layer of vinyl faced batt insulation behind sheathing and continuous rigid insulation. Minimum R-values as noted in wall assembly on Drawings.
   1. Faced Metal Building Batt Insulation: ASTM C991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch-wide, continuous, vapor-tight edge tabs.
      a. Manufacturers/Suppliers: Provide from same source as metal building roof insulation.
      b. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than 0.02 perm when tested according to ASTM E96/E96M, Desiccant Method.
         1) Composition: White polypropylene film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.
      c. UL flame spread classification of 25 or less and smoke developed index less than 50.
      d. Color: White.

C. Retainer Strips: For securing insulation between supports, 0.025-inch nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

D. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than 0.02 perm when tested according to ASTM E96/E96M, Desiccant Method.
   1. Composition: White polypropylene film facing and fiberglass-polyester-blend fabric backing.

E. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder. Same color as vapor retarder.

2.9 WALL SHEATHING

A. Glass Mat Faced Gypsum Sheathing: ASTM C1177.
   1. Manufacturers and Products:
      a. CertainTeed Corporation GlasRoc.
      b. G-P Gypsum Dens-Glass Sheathing.
      c. National Gypsum Gold Bond eXP.
      d. USG Corporation Securock.
      e. Or approved equal.
   2. Thickness: 5/8 inch Type X.

2.10 EXTERIOR PERSONNEL DOORS AND FRAMES

A. Exterior Swinging Personnel Doors and Frames:
   1. Metal building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.

B. Steel Doors: 1-3/4 inches thick; fabricated from metallic-coated steel face sheets, 0.036-inch nominal uncoated steel thickness, of seamless, hollow-metal construction; with 0.060-inch nominal uncoated steel thickness, inverted metallic-coated steel channels welded to face sheets at top and bottom of door.
   1. Design: Flush panel, with glazed half-lite.
   2. Core: Kraft honeycomb with U-factor rating of at least 0.47 Btu/sq. ft. x h x deg F.
   3. Glazed hollow metal door openings: Manufacturer standard glazing framed opening and accessories..
      a. Frame Design: Half-Lite.
      b. Finish: Factory primed for paint.
      c. Glass: Laminated and 1/4 inch thick safety glass.

C. Steel Frames: Fabricate 2-inch-wide face frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch nominal uncoated steel thickness.
   1. Type: Factory welded.
   2. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.

D. Hardware:
   1. Hinges: BHMA A156.1. Three plain-bearing, standard-weight, full-mortise, stainless

steel or bronze, template-type hinges; 4-1/2 by 4-1/2 inches, with nonremovable pin.
2. Lockset: BHMA A156.2. Key-in-lever cylindrical type.
3. Threshold: BHMA A156.21. Extruded aluminum.
4. Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
5. Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
6. Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.

E. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A123/A123M.

F. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

G. Finish:
1. Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.
a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
2. Field-Applied Paint Finish: See Section 099000 "Painting and Coating".
a. Color: As selected by Architect from manufacturer's full range.

2.11 INTERIOR PERSONNEL DOORS AND FRAMES

A. As specified in Section 081113 "Hollow Metal Doors and Frames".

2.12 OVERHEAD COILING DOORS

A. As specified in Section 083323 "Overhead Coiling Doors".

2.13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

A. As specified in Section 084113 "Aluminum-Framed Entrances and Storefronts".

2.14 GLAZED ALUMINUM CURTAINWALLS

A. As specified in Section 084413 "Glazed Aluminum Curtain Walls".

2.15 SKYLIGHTS

A. Skylights: Factory-fabricated, web-framed, square dome skylights designed for integration into pre-engineered metal building roof structures and compatible with single-ply TPO roof membranes. Units shall be certified as windborne debris/hurricane resistant and comply with the High Velocity Hurricane Zone (HVHZ) requirements or wind zone design pressures of the current Florida Building Code (FBC).
   1. Size: Nominal 48 x 48 inches (1219 x 1219 mm) rough opening.
   2. Glazing (OSHA & Hurricane-Compliant): High-impact resistant, co-extruded polycarbonate or laminated impact glass engineered to satisfy both OSHA fall protection standards (29 CFR 1910.28) and FBC large missile impact testing (ASTM E1886 / ASTM E1996) without the use of secondary external safety screens or cages.
      a. Outer Dome: High-impact, UV-stabilized clear or solar bronze polycarbonate or laminated outer lite.
      b. Inner Dome: White translucent polycarbonate or inner laminate for high light diffusion and maximum shatter resistance.
   3. Frame & Curb Construction:
      a. Frame: Extruded aluminum alloy 6063-T5 with a minimum thickness of 0.060 inch, featuring an integral condensation gutter with weep holes to drain moisture to the exterior.
      b. Finish: Marine-grade architectural coating for coastal environments].
      c. Thermal Break: Provide a continuous thermal break to prevent interior condensation and thermal bridging.
   4. Pre-Fabricated Curb for Metal Building / TPO Roof.
      a. Material: Minimum 14-gauge galvanized steel or 0.080-inch thick aluminum insulated roof curb, structurally engineered to span between the pre-engineered metal building purlins.
      b. Configuration: Built-in slope or crickets to match the metal roof pitch, ensuring positive drainage around the unit.
      c. Insulation: Minimum 1-1/2 inch (38 mm) thick, rigid fiberglass or polyisocyanurate insulation encapsulated within a double-wall curb design.
      d. TPO Compatibility: Curb shall feature a wide, weldable flashing flange or factory-applied TPO skirt suitable for hot-air welding directly to the field TPO roof membrane.
   5. Hardware, Fasteners, and Anchoring: Fully concealed, non-corrosive stainless steel fasteners. Provide severe-conformance anchor schedules tailored specifically to survive maximum design pressures. Provide factory-installed EPDM or neoprene gaskets to ensure a weather-tight seal between the glazing, frame, and curb.
   6. Performance Criteria (Pensacola, FL Compliance):
      a. Windborne Debris / Hurricane Resistance: Must carry a valid Florida Product Approval (FPA) tracking number or Miami-Dade County Notice of Acceptance (NOA) for Large Missile Impact Resistance.
      b. Design Pressure (DP): Capable of withstanding a minimum of +/- 60 PSF (or higher as calculated per ASCE 7 for project-specific wind zone categories and exposures in Pensacola, FL) under ASTM E330.

B. Manufacturers:
   1. Basis-of-Design Manufacturers: Subject to compliance with requirements, provide high-

impact, hurricane-rated skylights by one of the following preferred manufacturers:
a. Maxim Skylights (Basis of Design: Commercial Impact Series / OSHA-Compliant Hurricane Models).
b. American Skylights (Basis of Design: Ameriforce-100 or Dade 60 Series).
c. VELUX Commercial / Wasco (Basis of Design: Square Pyramid / Low Profile Hurricane Rated Systems.

2.16 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
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.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch standoff and minimum R-value of 3; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Other Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
   1. Provide flashing and trim 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.
   2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, sized according to SMACNA's "Architectural Sheet Metal Manual".
   1. Gutter Supports: Fabricated from same material and finish as gutters.
   2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot-long sections, complete with formed elbows and offsets.
   1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.036-inch nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.
   1. Blades: Fixed.
   2. Free Area: As indicated on Mechanical Drawings.
   3. Bird Screening: Galvanized steel, 1/2-inch-square mesh, 0.041-inch wire; with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.
      a. Mounting: Interior face of louvers.

H. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

I. Duct/Vent Flashing: Premolded, EPDM collar with flexible aluminum ring bonded to base. Coordinate size with mechanical installer.

J. Materials:
   1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Where exposed, provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
      a. Fasteners for Metal Roof and Wall Panels: Self-drilling, Type 410 stainless steel or

self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head.
1) Provide with EPDM washer under heads of fasteners bearing on exposed weather side of metal panels.

b. Fasteners for Metal Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
c. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
d. Fasteners for Gypsum Sheathing: ASTM C954 screws with wafer heads and reamer wings. Type 304 or 316 stainless steel or polymer-coated.
1) Polymer-Coated Fasteners: Resistant to salt spray for more than 800 hours per ASTM B117.

2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:
a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.17 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.
1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
   1. Make shop connections by welding or by using non-high-strength bolts.
   2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
   1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.18 SOURCE QUALITY CONTROL

A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
   1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

B. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
   1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
      a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
   1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
   2. Locate and space wall girts to suit openings such as doors and windows.
   3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
   1. Tighten rod and cable bracing to avoid sag.
   2. Locate interior end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and

electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL PANEL INSTALLATION, GENERAL

A. 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 UL-certified, 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. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
   1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
      a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
   2. Install metal panels perpendicular to structural supports unless otherwise indicated.
   3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Locate metal panel splices over structural supports with end laps in alignment.
   6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
   1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
   1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
   2. Prepare joints and apply sealants to comply with requirements in Section 079200 - Joint Sealants.

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
   1. Install ridge and hip caps as metal roof panel work proceeds.
   2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
   3. Coordinate roof panels and flashing trim with hanging gutters.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer’s design engineer.
   1. Install clips to supports with self-drilling or self-tapping fasteners.
   2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
   3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
   4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
   5. Provide metal closures at peaks, rake edges, rake walls and each side of ridge and hip caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Extend full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Coordinate with installation of sheathing, weather barrier, and continuous rigid insulation.
   2. Subframing Support System: Install subframing supports in orientation, sizes, and locations shown on Shop Drawings. Coordinate with continuous insulation and fasten through weather barrier and sheathing to secondary framing.
   3. Unless otherwise indicated, begin metal panel installation at corners.

4. Shim or otherwise plumb substrates receiving metal wall panels.
5. When two rows of metal panels are required, lap panels 4 inches minimum.
6. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
7. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
8. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
9. Install screw fasteners in predrilled holes.
10. Install flashing and trim as metal wall panel work proceeds.
11. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
12. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
13. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of continuous rigid insulation. Attach metal wall panels to supporting construction with fasteners at location and spacing as recommended by manufacturer's design engineer. Align fasteners in uniform rows horizontally and vertically whenever possible.

3.7 SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 WALL SHEATHING AND WEATHER BARRIER INSTALLATION

A. Wall Sheathing: Promptly after wall blanket insulation has been installed and secured to secondary framing, install continuous wall sheathing.
1. Use sound, undamaged materials.
2. Spacing: Leave expansion space at panel joints and adjacent assemblies as recommended by manufacturer.
3. Install per GA-253.
4. Screw gypsum sheathing to secondary framing.
5. Install fasteners to bear against panel face. Do not install fasteners through panel face.
6. Do not leave panels exposed to moisture. Replace wet panels or allow to dry completely before installing sealants, tape, weather barrier and wall panels.

B. Weather Barrier: Install continuous mechanically-attached sheet weather barrier to outside face of sheathing. Seal laps, penetrations, edge terminations and tears. Lap weather barrier flashing over metal wall panel flashing. See also Section 072700.

3.9 THERMAL INSULATION INSTALLATION

A. Blanket Roof Insulation: Comply with the following installation method to provide double layer insulation blankets and liner system (LS) with thermal spacer blocks.
   1. Install roof insulation system concurrently with metal roof panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
   2. OSHA-Compliant Fall Protection Liner System: Strictly comply with manufacturer's instructions and training. Install straight and taut longitudinal and transverse steel band retainer strips beneath purlins. Install continuous vapor retarder sheet between retainer strips and purlins. Continue both strips and vapor retarder over primary structural framing.
      a. Coordinate with mechanical and electrical equipment hanger attachment to structural framing and penetrations through roof.
      b. Tape or otherwise seal joints, penetrations, and ruptures in vapor retarder per manufacturer's instructions to the surrounding construction to ensure airtight installation.
   3. Install blankets straight and true in one-piece lengths, snug fit at each edge and at each end.
   4. Extend bottom layer of insulation between purlins.
   5. Extend top layer of insulation over first layer, perpendicular to purlins, filling space formed by metal roof panel standoffs.
   6. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks over compressed top insulation layer.

B. Blanket Wall Insulation:
   1. Install blanket wall insulation immediately prior to wall sheathing installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
   2. Set vapor-retarder-faced units with vapor retarder toward warm side of construction.
   3. Between-Girt Installation: Extend insulation blankets straight and true, in one piece horizontal lengths between girts, snug fit to each edge and at each end. Carry vapor-retarder-facing tabs up, over, and adhere to outside face of girts, overlapping adjoining facing of next insulation course and maintaining continuity of retarder.
   4. Extend insulation and vapor retarder up to and over top flange of secondary framing for continuity with roof insulation.
   5. Tape joints and ruptures in vapor retarder to ensure airtight installation.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

3.10 EXTERIOR DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

B. Personnel Doors and Frames: Install doors and frames according to NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
   1. Between Doors and Frames at Jambs and Head: 1/8 inch.
   2. Between Edges of Pairs of Doors: 1/8 inch.
   3. At Door Sills with Threshold: 3/8 inch.
   4. At Door Sills without Threshold: 3/4 inch.

C. Overhead Coiling Doors: See overhead coiling door installation requirements in Section 083323. Comply with door manufacturer’s instructions. Set doors and operating equipment with necessary hardware, jamb and head mold stops, continuous hood flashing, anchors, inserts, hangers, and equipment supports.

D. Door Hardware: See Section 087100.
   1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".
   2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
   4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 - Joint Sealants.

3.11 WINDOW INSTALLATION

A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.
   1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Set sill members in bed of sealant or with gaskets, for weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Mount screens directly to frames with tapped screw clips.

3.12 ACCESSORY INSTALLATION

A. General: 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 roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips,

and similar items.
a. Provide metal substrate support and install composite trim at eave and rake fascias.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
a. Provide metal substrate support and install composite trim at outside corners.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. 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. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
3. Composite Trim: Install boards true to line and levels indicated. Provide for thermal expansion as indicated in manufacturer's instructions. Field paint in accordance with Section 099000. Seal face joints with matching color sealant after painting.

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch 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.
1. Provide elbows at base of downspouts to direct water away from building. Coordinate with splash blocks.

E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

F. Vent Flashing: Form flashing around vent penetration and metal roof panels. Fasten and seal to panel as recommended by metal building system manufacturer.

3.13 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality

control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

C. Test and Inspection Agency will prepare test and inspection reports.

3.14 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.15 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Touchup Painting: Cleaning and touchup painting are specified in Section 099000 - "Painting and Coating.

C. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
   1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

D. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.
   1. Immediately before final inspection, remove protective wrappings from doors and frames.

E. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

END OF SECTION

SECTION 142400

HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

A. Work Results:
1. Holeless hydraulic elevators.

B. Principal Products:
1. Hydraulic elevators.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
1. Coordinate Work of this Section with adjacent work.

B. Preinstallation Meeting Attendees and Procedures:
1. Conduct meeting one month, minimum, before starting Work of this Section.
2. Additional Agenda Items:
a. Temporary Elevator Use: Review scheduling, cleaning, operator employment, and system maintenance.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Signal and operating fixtures, operating panels, indicators.
2. Car design, dimensions, layout, and components.
3. Car and hoistway door and frame details.
4. Electrical characteristics and connection requirements.
5. Hydraulic fluid.
6. Initial selection color charts and Samples.

B. Shop Drawings:
1. Section view, floor heights, pit equipment locations, and disconnects.
2. Motor and hydraulic pump, valves, piping, controller, power conversion unit and selector and other component locations.
3. Detail cars, guide rails, buffers, traveling cables, and other hoistway components.
4. Show rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
5. Individual weight of principal components; load reactions at points of support.

6. Loads on hoisting beams.
7. Clearances and over travel of car.
8. Locations in hoistway and machine room of connections for car light and telephone.
9. Location and sizes of access doors, doors, and frames.
10. Expected heat dissipation of elevator equipment in machine room.
11. Interface with building security system.
12. Electrical characteristics and connection requirements.
13. Applicable seismic design data.
14. Arrangement of equipment in machine room for equipment repairs or replacement without disturbing other components. Arrange equipment for clear passage through access door.

C. Delegated Design Submittals:
1. Seismic resistance design.
2. All Delegated Design Work signed and sealed by the professional engineer responsible for their preparation.

D. Samples:
1. Handrail Material: 12 inches long section.
2. Car Door and Frame Finishes: Manufacturer standard sizes.
3. Car Interior Wall and Ceiling Finishes: Manufacturer standard sizes.
4. Hoistway Door and Frame Finishes: Manufacturer standard sizes.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Acceptance of hoistway, pit, electrical service, and machine room.

B. Manufacturer Reports: Field test and inspection reports.

C. Qualification Statements:
1. Installer: Manufacturer approval.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Technical information for servicing operating equipment.
3. Legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the Work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.
4. Master electric and hydraulic schematic and lubrication chart.

B. Continuing maintenance proposal.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Car Panel Cabinet Keys: Two, minimum.

B. Tools: Manufacturer recommended special tools required to maintain elevators.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Elevator manufacturer or independent manufacturer approved installer.

1.8 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 HYDRAULIC ELEVATORS

A. Hydraulic Elevator Systems: Holeless type with motor and pump in adjacent machine room.
   1. Manufacturers and Products:
      a. TK Elevator endura MRL as basis of design.
      b. Otis HydroFit.
      c. Or approved equal.

B. Elevator Characteristics:
   1. Group Size: One Unit.
   2. Rated Speed: 150 fpm.
   3. Passenger Rated Net Capacity: 3000 pounds.
   4. Nominal Platform Size: See Drawings and Large enough for a stretcher..
   5. Clear Inside Car Dimensions: See Drawings.
   6. Ceiling Height: See Drawings.
   7. Hoistway and Car Entrance Frame Openings:
      a. Width: 42 inches.
      b. Height: 80 inches.
   8. Door Type: Single panel.
   9. Door Operation: Single speed center opening.
   10. Number of Openings: One front doors.
   11. Operation System: Selective collective automatic operation.

C. Door Control Features: Open doors automatically when car arrives at floor.
   1. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.

2. Door Reopening System: Multibeam infrared light curtain.
3. Nudging: When obstruction prevents doors from closing for field adjustable time, automatically disconnect door reopening devices, close doors slowly until obstruction is cleared. Sound buzzer.

D. Interconnect elevator control system with building fire alarm, card access, and security system.

E. Temporary Elevator Use for Construction Operations:
1. Enclose cars with protective plywood on floor, walls, and ceiling.
2. Provide temporary lighting.
3. Provide control panel with manual and emergency operation with key operation for attendant operator.

2.2 EQUIPMENT

A. Motor, Pumps, Valves, Regulators, Fluid Tank, Controller, Controls, Buttons, Wiring and Devices, Indicators: Elevator manufacturer integrated system components.
1. Hydraulic Fluid: Readily biodegradable, non-toxic to aquatic life per ASTM D2772; elevator manufacturer approved.

B. Guide Rails, Cables, Spring Buffers, Attachment Brackets and Anchors: Purpose designed, sized per code with safety factors.

C. Lubrication:
1. Grease Fittings: For lubricating bearings requiring periodic lubrication.
2. Lubrication Points: Visible and easily accessible.

D. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when separate grounding conductor is also installed across joint.

E. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.

2.3 CAR CONSTRUCTION

A. Frame: Rigid and braced, rolled or formed steel sections, mounted on resilient isolators.

B. Platform: Steel plate, ready to receive floor finish.

2.4 CAR INTERIOR

A. Flooring: Recess car floor sufficient depth to align floor finish with door sill.
1. Resilient Tile: See Section 096500.

B. Walls:
   1. Stainless steel.

C. Wall Reveals:
   1. Stainless steel.

D. Front Return Panel:
   1. Stainless steel.

E. Base: See Drawings.
   1. As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.

F. Ceiling: See Drawings.
   1. Decorative metal on plywood.
   2. Accommodate emergency access.

G. Light Fixtures:
   1. Lamps: LED.
   2. Fixtures: Downlights.

H. Ventilation: Two speed fan.

I. Hand Rails: Stainless steel.
   1. Configuration: Flat bar.
   2. Location: Mounted on rear wall and side walls, space 1-1/2 inches clear of wall.

J. Pad Hooks: Stainless steel.

K. Protective Pads: Canvas covers, padded with fill material, sewn with piping edges; brass grommets spaced to match pad hook spacing in car, covering side and rear walls and front return, except cut out for control panel.
   1. Quantity: One set for each car size.

L. Certificate Frame and Glazing: Stainless steel frame, clear tempered glass attached with tamper proof screws.

2.5 CAR ENTRANCES

A. Car Doors:
   1. Material: Stainless steel.
   2. Construction: Hollow panels.
   3. Design: Flush, rolled profiles, rigid construction.
   4. Fabricate front return panels same as doors.

B. Car Door Frames:
   1. Material: Stainless steel.
   2. Construction: Welded corner design with smooth invisible joints.

C. Thresholds: Extruded aluminum.

2.6 HOISTWAY ENTRANCES

A. Hoistway Doors:
   1. Material: Stainless steel.
   2. Construction: Hollow panels.
   3. Design: Flush, rolled profiles, rigid construction.
   4. Fabricate front return panels same as doors.

B. Hoistway Door Frames:
   1. Material: Stainless steel.
   2. Construction: Welded corner design with smooth invisible joints.

C. Door and Frame Fire Rating: 1-1/2 hours.

D. Sills: Extruded aluminum.

2.7 CAR OPERATING PANEL

A. Panels:
   1. Quantity: One per car.
   2. Type: Flush.
   3. Call Buttons: Illuminated, with tactile symbols and Braille.
   4. Other Buttons: Alarm, Door Open, and Door Close.
   5. Include service cabinet integral with front return panel, with hinged door containing:
      a. Independent service switch.
      b. Inspection switch.
      c. Fan or blower switch.
      d. Light switch.
      e. Emergency light test switch.
      f. Additional operating switches for special features specified.
      g. Convenience Receptacle: 120 V, 15 A.
   6. Car position indicators.
   7. Emergency light.
   8. Flush mounted emergency communications system.

2.8 LANDING CONTROLS

A. Landing Buttons: Stainless steel, illuminating type, marked with directional arrows.
   1. Terminal Landings: One button.
   2. Other Landings: One for originating UP and one for originating DOWN calls.

B. Landing Position Indicators: Illuminating.

C. Car Direction Indicators: Illuminating, with audible signal.

2.9 PERFORMANCE

A. Follow State standards.

B. Design, fabricate, and install elevators per ASME A17.1.

C. Delegated Design:
   1. Structural Design Criteria: See Structural Drawings.

D. Fire Resistance:
   1. Hoistway Doors and Frames: NFPA 252 or UL 10B.

E. Surface Burning Performance: ASTM E84 Class A.
   1. Flame Spread Index: 25, maximum.
   2. Smoke Developed Index: 50, maximum.

F. Accessibility Requirements: Applicable provisions in Department of Justice publication 2010 ADA Standards for Accessible Design and state accessibility code.

G. Electrical Products: Listed and classified by independent testing firm acceptable to authority having jurisdiction as suitable for purpose.

H. Adjust each elevator for optimum performance and in accordance with National Elevator Industry published Performance Standards.

2.10 OPERATION

A. Motors: NEMA MG 1.

B. Disconnect Switch: Factory mounted on equipment.

C. Operation Sequences: Two-stop automatic and with card access control from Level 1 to Level 2.
   1. Firefighter Emergency Operation: Phase I emergency recall and Phase II emergency in-car operation per ASME A17.1.
   2. Power Loss Operation: Standby powered operation.

D. Security:
   1. Card Readers: Install in car operating panel. Coordinate with Division 28 Electronic Safety and Security.

E. Shunt Trip: Provide means installed per NFPA 72 to automatically disconnect power supply to elevator prior to activating automatic sprinkler within elevator hoistway or machine room.

2.11 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ASTM A36.

B. Sheet Steel: ASTM A1008.

C. Galvanized Sheet Steel: ASTM A653, zinc coated to G90.

D. Stainless Steel: ASTM A666, Type 304.

E. Bronze Plate and Sheet: ASTM B36, Alloy UNS C38500.

F. Aluminum Extrusions: ASTM B221.

G. Plywood: APA/EWA PS2 Structural I.

H. Plastic Laminate: ISO 4586-3, Type HGS; Architect selected for color, pattern, and finish.

I. Shop Primer: SSPC 15, Type 1, red oxide.

J. Touch Up Primer: Match shop primer.

2.12 FINISHES

A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.

B. Machine Room Components: Clean and degrease; prime one coat, finish with two coats of enamel.

C. Aluminum: Mill finish.

D. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two coats of enamel sprayed and baked; color as selected.

E. Galvanized Surfaces: Clean with neutralizing solvent; prime one coat.

F. Stainless Steel: No. 4.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify hoistway and pit are ready for work of this Section.

B. Verify machine room are ready for work of this Section.

C. Verify hoistway shaft and openings are correctly sized and within allowable tolerances.

D. Verify electrical power is available and has correct characteristics.

3.2 PREPARATION

A. Arrange for temporary electrical power for installation Work and testing of elevator components.

3.3 INSTALLATION

A. Follow ASME A17.1.

B. Install system components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.

C. Install conduit, boxes, wiring, and accessories.

D. Mount motor and pump unit on vibration and acoustic isolators. Securely fasten to building supports. Prevent lateral displacement.

E. Accommodate equipment in space provided.

F. Install guide rails using threaded bolts and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.

G. Accurately align guide rails. Assemble with smooth joints.

H. Bolt or weld brackets directly to structural steel hoistway framing.

I. Bolt brackets to hoistway that will perform to four times rated pullout load.

J. Field Welds: Chip and clean away oxidation and residue, wire brush; spot prime with two coats.

K. Coordinate installation of hoistway wall construction.

L. Install hoistway door sills, frames, and headers in hoistway walls. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
   1. Fire Rated Doors: NFPA 80.

M. Fill hoistway door frames solid with grout and grout sills.

N. Adjust equipment for smooth and quiet operation.

O. Erection Tolerances:
   1. Guide Rail Alignment: Plumb and parallel to each other per ASME A17.1.
   2. Car Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to Work areas.
   1. Provide two weeks written notice of date and time of tests.
   2. Failed Test Retest Cost: Contractor responsibility.

B. Testing: ASME A17.1.
   1. Supply instruments and execute specific tests.

C. Non Conforming Work: Make corrections or replace, and retest.

D. Manufacturer Services:
   1. Obtain required permits to perform tests. Perform tests required by regulatory agencies.
   2. Schedule tests with agencies and Architect, Owner, and Contractor present.
   3. Furnish test and approval certificates issued by jurisdictional authorities.

3.5 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.

B. Adjust automatic floor leveling feature at each floor to provide stopping zone of 1/4 inch.

3.6 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components ready for inspection.

3.7 CLOSEOUT ACTIVITIES

A. Training: Provide onsite training to management.

B. Engineering Support: Provide engineering support to any maintaining Contractor designated by the Owner. Provide manuals, engineering Drawings, and circuit diagrams with equipment at time of delivery. Documentation available for replacement cost by any installing or maintaining elevator Contractor or other entity designated by Owner.

3.8 PROTECTION

A. Do not permit construction traffic within car after cleaning.

3.9 MAINTENANCE

A. Full Maintenance Service: Provide complete maintenance service by installer, including standard monthly preventive maintenance. Repair or replace worn equipment, and include normal lubrication, cleaning, and adjustment as recommended by manufacturer of elevator system components. Initial maintenance period is 12 months, starting on date of substantial completion.

B. Maintenance Service Proposal: Submit proposal to provide continuing service as specified above for a period of 24 months following expiration of initial maintenance period.

C. Examine, adjust, and lubricate elevator equipment; maintain hydraulic fluid levels. Repair and replace parts when required to maintain reliable serviceability. Use original equipment manufacturer replacement parts.

D. Perform Work without removing cars during peak traffic periods.

E. Provide emergency call back service 24 hours a day.

F. Maintain locally, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.

G. Perform maintenance using qualified personnel in direct employ of elevator manufacturer or original installer.

H. Do not assign or transfer maintenance to agent or Subcontractor without Owner prior written consent.

END OF SECTION