

# **Twin Falls Fire Station – 3**

**Twin Falls, Idaho**

PROJECT MANUAL – SPECIFICATIONS FOR 100% CD

VOLUME - 1 OF 2

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## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

#### A . Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and Drawing conventions.
14. Miscellaneous provisions.

### 1.3 PROJECT INFORMATION

#### A . Project Identification: Twin Falls Station 3.

1. Project Location: 1025 Washington Street South, Twin Falls, ID 83301.

#### B . Owner: City of Twin Falls.

### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

#### A . The Work of Project is defined by the Contract Documents and consists of the following:

1. Sitework, General Trades, Plumbing, HAVC, Fire Protection, and Electrical for a new, one story fire station.

### 1.5 WORK BY OWNER

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



B. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.

1. Various FF&E Items as mutually agreed upon between Owner and CMGC.

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

1. Various FF&E Items as mutually agreed upon between Owner and CMGC. access control system, alerting system, radio system, data system.

#### 1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:

1. Various FF&E Items as mutually agreed upon between Owner and CMGC.

#### 1.7 ACCESS TO SITE

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

#### 1.8 WORK RESTRICTIONS

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

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

B. Restricted Substances: Use of controlled substances on Project site is not permitted.

#### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. 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. Imperative mood and streamlined language are generally used in the Specifications. 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.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

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

### 1.3 DEFINITIONS

- A . Alternate: An amount proposed by bidders for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the 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 alternates 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 . Execute accepted alternates under the same conditions as other work of the Contract.
- C . Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### 3.1 SCHEDULE OF ALTERNATES

- A . To be determined.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for 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 ACTION SUBMITTALS

- A . Substitution Requests: 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: CSI 13.1A and 13.1B, or contractor's similar form that provides the same information.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitutions 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 as well as names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions 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 business days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 business days of receipt of request, or seven business days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Substitution Request Form Approved by Architect, 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 a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.6 PROCEDURES

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

## 1.7 SUBSTITUTIONS

- A. Submit requests for substitution immediately on discovery of need for change, but not later than 15 business 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:
    - 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.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for handling and processing Contract modifications.

### 1.3 MINOR CHANGES IN THE WORK

- A . Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time'.

### 1.4 PROPOSAL REQUESTS

- A . Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  2. Within time specified in Proposal Request or 20 business days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include information regarding impact to construction schedule. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use forms acceptable to Architect.
- B . Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

#### 1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor.

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

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

### 1.3 DEFINITIONS

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

### 1.4 SCHEDULE OF VALUES

- A . Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven business days before the date scheduled for submittal of initial Applications for Payment.
- B . Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's Project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIADocumentG703.

3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Change Orders (numbers) that affect value.
  - e. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site.
6. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
7. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
8. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
9. Provide following items as separate line items:
  - a. Site Mobilization
  - b. Bonds and Insurance
  - c. General Conditions
  - d. Demobilization
  - e. Punch List Work
  - f. Owner Training
  - g. Project Closeout
  - h. Submittals for which the contractor desires to receive payment independent of material purchase/installation shall be itemized as separate line items, such as pre-engineered or design-build work.
10. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

## 1.5 APPLICATIONS FOR PAYMENT

- A . Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B . Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C . Payment Application Times: The period covered by each Application for Payment is one month, ending on the last day of the month.
  - 1. Submit draft copy of Application for Payment seven business days prior to due date for review by Architect.
- D . Application for Payment Forms: Use AIADocumentG702 and AIADocumentG703 as form for Applications for Payment.
- E . Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F . Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G . Transmittal: Submit number as required by City of Twin Falls signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H . Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I . Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Schedule of unit prices.
  7. Submittal schedule (preliminary if not final).
  8. List of Contractor's staff assignments.
  9. List of Contractor's principal consultants.
  10. Copies of building permits.
  11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  12. Initial progress report.
  13. Report of preconstruction conference.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.
- J . Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K . Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIADocumentG706.
  5. AIADocumentG706A.
  6. AIADocumentG707.
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  9. Final liquidated damages settlement statement.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Project meetings.
- B . Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C . Related Requirements:
  - 1. Documentation for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
  - 4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

### 1.3 DEFINITIONS

- A . BIM: Building Information Modeling.
- B . RFI: Request for Information. Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

### 1.4 INFORMATIONAL SUBMITTALS

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

- B . Key Personnel Names: Within 15 business days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

## 1.5 GENERAL COORDINATION PROCEDURES

- A . Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B . Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- C . Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D . Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

1.6 REQUEST FOR INFORMATION (RFI)

- A . General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B . Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Name of Contractor.
  4. Name of Architect.
  5. RFI number, numbered sequentially.
  6. RFI subject.
  7. Specification Section number and title and related paragraphs, as appropriate.
  8. Drawing number and detail references, as appropriate.
  9. Field dimensions and conditions, as appropriate.
  10. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  11. Contractor's signature.
  12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C . RFI Forms: AIADocumentG716 or software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D . RFI that involves multiple consultants allow an additional 7 business days for Architect's response for each RFI.
- E . Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven business days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.



- d. Requests for coordination information already indicated in the Contract Documents.
  - e. Requests for adjustments in the Contract Time or the Contract Sum.
  - f. Requests for interpretation of Architect's actions on submittals.
  - g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 business days of receipt of the RFI response.
- F . RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Include the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
  8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- G . On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven business days if Contractor disagrees with response.

#### 1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A . Use of Architect's Digital Data Files: Digital data files of Architect's exported Autocadd files will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
  2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  3. Digital Drawing Software Program: Contractor shall execute a data licensing agreement in the form of AIADocumentC106 Digital Data Licensing Agreement.
    - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIADocumentC106.

- B . PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
  3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

## 1.8 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 a minimum of 10 business days prior to meeting.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three business days of the meeting.
- B . Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 business days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - l. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Sustainable design requirements.

- o. Preparation of Record Documents.
  - p. Work restrictions.
  - q. Working hours.
  - r. Owner's occupancy requirements.
  - s. Responsibility for temporary facilities and controls.
  - t. Procedures for moisture and mold control.
  - u. Procedures for disruptions and shutdowns.
  - v. Parking availability.
  - w. Office, work, and storage areas.
  - x. Equipment deliveries and priorities.
  - y. First aid.
  - z. Security.
  - aa. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C . Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.

- p. Compatibility of materials.
  - q. Acceptability of substrates.
  - r. Temporary facilities and controls.
  - s. Space and access limitations.
  - t. Regulations of authorities having jurisdiction.
  - u. Testing and inspecting requirements.
  - v. Installation procedures.
  - w. Coordination with other work.
  - x. Required performance results.
  - y. Protection of adjacent work.
  - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 business days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for completing sustainable design documentation.
    - f. Requirements for preparing operations and maintenance data.
    - g. Requirements for delivery of material samples, attic stock, and spare parts.
    - h. Requirements for demonstration and training.
    - i. Preparation of Contractor's punch list.

- j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
  - k. Submittal procedures.
  - l. Coordination of separate contracts.
  - m. Owner's partial occupancy requirements.
  - n. Installation of Owner's furniture, fixtures, and equipment.
  - o. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Status of sustainable design documentation.
      - 6) Deliveries.
      - 7) Off-site fabrication.
      - 8) Access.
      - 9) Site use.
      - 10) Temporary facilities and controls.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Status of correction of deficient items.
      - 14) Field observations.
      - 15) Status of RFIs.

- 16) Status of Proposal Requests.
  - 17) Pending changes.
  - 18) Status of Change Orders.
  - 19) Pending claims and disputes.
  - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Preliminary construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Three-week look-ahead schedule.
  - 4. Daily construction reports.
  - 5. Submittal schedule.
- B . Related Requirements:
  - 1. Section013300 "Submittal Procedures" for submitting schedules and reports.

### 1.3 DEFINITIONS

- A . Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B . CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C . Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D . Event: The starting or ending point of an activity.
- E . Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

#### 1.4 INFORMATIONAL SUBMITTALS

- A . Format for Submittals: Submit required submittals in the following format:
  1. Working electronic copy of schedule file, where indicated.
  2. PDF electronic file.
- B . Preliminary construction schedule.
- C . Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D . CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in business days.
  1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
- E . Construction Schedule Updating Reports: Submit with Applications for Payment.
- F . Daily Construction Reports: Submit at weekly intervals.

### **PART 2 - PRODUCTS**

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A . Time Frame: Extend schedule from date established for Notice to Proceed to date of Final Completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B . Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 14 business days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 business days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion.



5. Punch List ,and Final Completion.
- C . Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
    1. Phasing: Arrange list of activities on schedule by phase.
    2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
    3. Owner-Furnished Products: Include a separate activity for each product.
    4. Work Restrictions: Show the effect of the following items on the schedule:
      - a. Coordination with existing construction.
      - b. Limitations of continued occupancies.
      - c. Uninterruptible services.
      - d. Partial occupancy before Substantial Completion.
      - e. Use of premises restrictions.
      - f. Provisions for future construction.
      - g. Seasonal variations.
      - h. Environmental control.
  - D . Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
  - E . Recovery Schedule: When periodic update indicates the Work is 14 or more business days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, business days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
  - F . Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

## 2.2 PRELIMINARY CONSTRUCTION SCHEDULE

- A . Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven business days of date established for Notice to Proceed.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A . Startup Network Diagram: Submit diagram within 10 business days of date established for Notice to Proceed. Outline significant construction activities for the first 60 business days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- B . CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
  1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 20 business days after date established for Notice to Proceed.

- C . CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing and commissioning.
    - j. Punch list and final completion.
    - k. Owner Training.
    - l. Record Documents.
    - m. Activities occurring following final completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- D . Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration business days.
  8. Total float or slack time.

- E . Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations business days.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.

#### 2.4 THREE-WEEK LOOK-AHEAD SCHEDULE.

- A . Prepare three-week look-ahead schedule at weekly intervals. Provide detailed breakdown of daily activities and milestones. Identify information needed and inspections required by third parties.

#### 2.5 REPORTS

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

### **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.
- B . Distribution: Distribute PDF files of monthly schedule updates and post to Owner's project website.
  - 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.

#### 3.2 THREE-WEEK LOOK-AHEAD SCHEDULE.

- A . Submit three-week look-ahead schedule weekly at construction progress meetings.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A . Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B . Related Requirements:
  - 1. Section012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section017900 "Demonstration and Training" for submitting documentation of demonstration of equipment and training of Owner's personnel.

### 1.3 DEFINITIONS

- A . Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.
- 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.

### 1.4 ACTION SUBMITTALS

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

- a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for purchasing.
  - i. Scheduled dates for installation.
  - j. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A . Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
- B . Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architects 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 10 business days for initial review of each submittal. Allow additional 10 business days 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 5 business days for review of each resubmittal.
- C . Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
  1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Engineer.
  4. Transmittal Form for Electronic Submittals: Use form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Name and address of Architect.
    - c. Name of Construction Manager.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.
    - m. Related physical samples submitted directly.
    - n. Indication of full or partial submittal.
    - o. Transmittal number.
    - p. Submittal and transmittal distribution record.
    - q. Other necessary identification.
    - r. Remarks.
- D . Options: Identify options requiring selection by Architect.
- E . Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- F . Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- G . Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- H . Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## **PART 2 - PRODUCTS**

### 2.1 SUBMITTAL PROCEDURES

- A . General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B . Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before or concurrent with Samples.



6. Submit Product Data in the following format:
  - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital files is otherwise permitted.
  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.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- K. Sustainability Documentation: Comply with requirements specified in Division 01 Section "Sustainable Design Requirements."
- L. 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.

- M . 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.
- N . 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.
- O . 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.
- P . Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q . Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R . 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.
- S . Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T . Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- U . 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.
- V . Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W . 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.

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

## 2.2 DELEGATED-DESIGN SERVICES

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

## 2.3 CONTRACTOR'S REVIEW

- A . Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B . Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C . Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

## 2.4 ARCHITECT'S ACTION

- A . Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B . Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- 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 . Submittals not required by the Contract Documents may be returned by the Architect without action.

**PART 3 - PRODUCTS (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for quality assurance and quality control.
- B . Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Agent or authorities having jurisdiction are not limited by provisions of this Section.
  - 4. Specific test and inspection requirements are not specified in this Section.

### 1.3 CONFLICTING REQUIREMENTS

- A . Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B . Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

### 1.4 INFORMATIONAL SUBMITTALS

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

#### 1.5 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.

## 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29CFR1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.



- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. **Contractor responsibilities include the following:**
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.
  - 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Agent, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

## 1.7 QUALITY CONTROL

- A. **Owner Responsibilities:** Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. **Contractor Responsibilities:** Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 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 Commissioning Agent and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Owner, and Commissioning Agent and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
- 1.8 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: Owner will engage a qualified Special Inspection agency to conduct special tests and inspections required by authorities having jurisdiction.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Architect.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Owner's and Commissioning Agent 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

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 DEFINITIONS

- A . General: Basic Contract definitions are included in the Conditions of the Contract.
- B . "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C . "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D . "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E . "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F . "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G . "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H . "Provide": Furnish and install, complete and ready for the intended use.
- I . "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

### 1.3 INDUSTRY STANDARDS

- A . Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B . Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- 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's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B . Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.
- C . Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.
- D . Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the.
- E . State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION (NOT USED)**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

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

### 1.3 USE CHARGES

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

### 1.4 QUALITY ASSURANCE

- A . Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA70.
- 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: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

- A . Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts.

- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- D. 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.
- E. All project signs and construction signs shall be fabricated from the following materials:
  - 1. Plywood Face: High density overlay type, with overlay 0.012" thick each side, 45% resin content by dry weight, and minimum weight of 60 pounds/thousand sq. ft. of surface.  $\frac{3}{4}$ " nominal plywood thickness shall be provided.
  - 2. Paint: Exterior, gloss, alkyd enamel. Provide 2 coats on all sign faces, backs and edges and 1 coat on all posts.
  - 3. Wood Posts: Douglas Fir, S4S, with design stress of 1400psi fb minimum. Paint the entire post before embedding in earth. Provide posts in sizes and depths of embedment as indicated.

## 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.
  - 4. Warranty of all equipment used for temporary use shall start at the date of Substantial Completion.



### **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.

#### 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: Install water service and distribution piping in sizes and pressures adequate for construction.
- C . Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D . Heating: Provide temporary heating 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 . Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F . Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G . Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

- 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.
- I . Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel.
  - 1. Provide cellular telephone service for project manager and site superintendents.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A . General: Comply with the following:
- B . Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.
  - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C . Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
- D . 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.
- E . Parking: Provide temporary parking areas for construction personnel.
- F . Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- G . Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional and safety signage for construction personnel and visitors.
    - b. Provide temporary signs and postings are required by the authority having jurisdiction.
  - 2. The Contractor shall provide the "Project Sign." Layout and design to include but not limited to:
    - a. Building graphic image and owner's graphic logo.
    - b. Project Name

- c. Owner's Name
  - d. Architect names.
  - e. Contractor's names
  - f. Area of plywood shall be 72" x 48" maximum
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- I. 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.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Earthwork.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Site Enclosure Fence: Provide site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- I. 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; manage fire-prevention program.
- 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.

### 3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  1. Protect porous materials from water damage.
  2. Protect stored and installed material from flowing or standing water.
  3. Keep porous and organic materials from coming into prolonged contact with concrete.
  4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.
  5. Do not install material that is wet.
  6. Discard, replace, or clean stored or installed material that begins to grow mold.
  7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Use permanent HVAC system to control humidity.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. 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.
- B . Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C . Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

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

### 1.3 DEFINITIONS

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

### 1.4 QUALITY ASSURANCE

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

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A . Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B . Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C . Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 6. Protect stored products from damage and liquids from freezing.
  - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 1.6 PRODUCT WARRANTIES

- A . Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B . Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

## **PART 2 - PRODUCTS**

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
  1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.



- b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C . Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D . Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

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

## **PART 3 - EXECUTION**

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

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

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
  1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B . Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

- C . Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A . Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B . Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C . Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D . Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A . Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.
- B . General: Engage a land surveyor to lay out the Work using accepted surveying practices.
  1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish limits on use of Project site.
  3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  4. Inform installers of lines and levels to which they must comply.
  5. Check the location, level and plumb, of every major element as the Work progresses.
  6. Notify Architect and Owner when deviations from required lines and levels exceed allowable tolerances.
  7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C . Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D . Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

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

### 3.4 FIELD ENGINEERING

- A . Identification: Owner will identify existing benchmarks, control points, and property corners.
- B . Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C . Benchmarks: Establish and maintain permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D . Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework. Provide with Record Documents.

### 3.5 INSTALLATION

- A . General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- 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 . Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F . Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G . 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.
- H . Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I . 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.
- J . Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 OWNER-INSTALLED PRODUCTS

- A . Site Access: Provide access to Project site for Owner's construction personnel.
- B . Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### 3.7 PROGRESS CLEANING

- A . General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven business days during normal weather or three business days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 013200 "Construction Progress Documentation."
- 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.

### 3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- C . Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D . Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E . Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

- A . Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B . Related Requirements:
  - 1. Section017300 "Execution" for progress cleaning of Project site.
  - 2. Section017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Section017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Section017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

### 1.3 ACTION SUBMITTALS

- A . Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B . Certified List of Incomplete Items: Final submittal at Final Completion.

### 1.4 CLOSEOUT SUBMITTALS

- A . Certificates of Release: From authorities having jurisdiction.
- B . Certificate of Insurance: For continuing coverage.

### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A . Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.



## 1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owners signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit sustainable design submittals required in Division 01 Section "Sustainable Design Requirements – IgCC" and "Construction Waste Management." Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  6. Advise Owner of changeover in heat and other utilities.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D . Inspection: Submit a written request for inspection to determine Substantial Completion prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Owner 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.

#### 1.7 FINAL COMPLETION PROCEDURES

- A . Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. All requirements of Substantial Completion must have been met.
  5. Confirm final change order has been executed.
  6. Submit "Affidavit of Payments of Debts and Claims" from the contractor. AIA form G706 or equivalent.
  7. Submit "Affidavit of Release of Liens" AIA form G706A or equivalent.
  8. Submit evidence of final, continuing insurance coverage complying with insurance requirements will remain in force after final payment, is currently in effect and will not be cancelled or allowed to expire at least 30 business days after written cancellation notice has been given to the owner.
  9. Submit a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the contract documents.
  10. Submit a "Consent of Surety to Final Payment". AIA form G707 or equivalent form
  11. Submit affidavits of wages paid.
  12. Submit certification that all materials used are Lead and Asbestos free.
  13. Complete final cleaning.
  14. All Warranties, Guarantees, training, manuals, operation instructions, certificates, as-built drawings and other Project Record Documents, maintenance manuals, training or items required by the Contract Documents or local governmental entities have been provided.
  15. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

- B. Inspection: Submit a written request for final inspection to determine acceptance prior to the date with work is expected to be completed and ready for final inspection and tests. On receipt of request, Architect and Owner 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.

#### 1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Name of Architect.
    - c. Name of Contractor.
    - d. Page number.

#### 1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 business days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

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

## **PART 3 - EXECUTION**

### 3.1 FINAL CLEANING

- A . General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B . Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
- l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
  - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
- p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- q. Leave Project clean and ready for occupancy.

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B . Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

### 1.3 DEFINITIONS

- A . System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B . Subsystem: A portion of a system with characteristics similar to a system.

### 1.4 CLOSEOUT SUBMITTALS

- A . Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect and Commissioning Agent will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B . Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

- b. Enable inserted reviewer comments on draft submittals.
  2. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Include spine labels.
- C. Initial Manual Submittal: Submit draft copy of each manual. Architect and commissioning agent will comment on whether general scope and content of manual are acceptable.
  1. Correct or revise each manual to comply with Architect's and commissioning agent's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and commissioning agent's comments and prior to commencing demonstration and training.

## **PART 2 - PRODUCTS**

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  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 Authority.
  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, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F . Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.



2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Flood.
  2. Gas leak.
  3. Water leak.
  4. Power failure.
  5. Water outage.
  6. System, subsystem, or equipment failure.
  7. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
  1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A . Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B . Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C . Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  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.

## 2.5 PRODUCT MAINTENANCE MANUALS

- A . Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B . Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C . Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 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.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A . Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B . Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- C . Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D . Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
- E . Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F . Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G . Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H . Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

### **PART 3 - EXECUTION**

#### **3.1 MANUAL PREPARATION**

- A . Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B . Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

- C . Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D . Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E . Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F . Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G . Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

- B . Related Requirements:

1. Section017300 "Execution" for final property survey.
2. Section017700 "Closeout Procedures" for general closeout procedures.
3. Section017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

### 1.3 CLOSEOUT SUBMITTALS

- A . Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:
  - a. Initial Submittal:
    - 1) Submit PDF electronic files of scanned record prints.
    - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
  - b. Final Submittal:
    - 1) Submit one paper-copy set(s) of marked-up record prints.
    - 2) Submit PDF electronic files of scanned record prints.
    - 3) Print each drawing, whether or not changes and additional information were recorded.

- B . Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

- C . Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

- D . Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities.
- E . Submit one paper copy and PDF electronic files of all Occupancy Permits and building and utility inspection cards.
- F . Submit one paper copy and PDF electronic files of all attendee lists of Owner demonstration and training sessions.

## **PART 2 - PRODUCTS**

### 2.1 RECORD DRAWINGS

- A . Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. 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. Format: Annotated PDF electronic file.
  3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  4. Identification: As follows:
    - a. Project name.
    - b. Designation "PROJECT RECORD DRAWINGS."
    - c. Name of Architect.
    - d. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders, record Product Data and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file and one paper copy.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.



1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B . Format: Submit record Product Data as annotated PDF electronic file and one paper copy.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

#### 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A . Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B . Format: Submit miscellaneous record submittals as annotated PDF electronic file and one paper copy.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

### **PART 3 - EXECUTION**

#### 3.1 RECORDING AND MAINTENANCE

- A . Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B . Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

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

### 1.3 INFORMATIONAL SUBMITTALS

- A . Attendance Record: For each training module, submit list of participants and length of instruction time. Include lists with Project Record Documents submittal.
- B . Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

### 1.4 CLOSEOUT SUBMITTALS

- 1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

### 1.5 QUALITY ASSURANCE

- A . Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B . Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

### 1.6 COORDINATION

- A . Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B . Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C . Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

## **PART 2 - PRODUCTS**

### 2.1 INSTRUCTION PROGRAM

- A . Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B . Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  - 4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.

- e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
    - a. Alignments.
    - b. Checking adjustments.
    - c. Noise and vibration adjustments.
    - d. Economy and efficiency adjustments.
  6. Troubleshooting: Include the following:
    - a. Diagnostic instructions.
    - b. Test and inspection procedures.
  7. Maintenance: Include the following:
    - a. Inspection procedures.
    - b. Types of cleaning agents to be used and methods of cleaning.
    - c. List of cleaning agents and methods of cleaning detrimental to product.
    - d. Procedures for routine cleaning
    - e. Procedures for preventive maintenance.
    - f. Procedures for routine maintenance.
    - g. Instruction on use of special tools.
  8. Repairs: Include the following:
    - a. Diagnosis instructions.
    - b. Repair instructions.
    - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    - d. Instructions for identifying parts and components.
    - e. Review of spare parts needed for operation and maintenance.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A . Do not schedule or begin Demonstration and Training sessions until equipment and systems are fully cleaned, adjusted, tested and operational.

- B . Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

### 3.2 INSTRUCTION

- A . Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B . Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C . Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least 14 business days' advance notice.
- D . Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E . If at any time during Demonstration and Training sessions the equipment or system fails to operate correctly, discontinue session. Contractor to adjust, repair, restore, re-clean and re-test system prior to re-scheduling session. Demonstration and Training sessions are not a substitute for system start-up, testing, commissioning, or adjustment.
- F . Restore systems and equipment to condition existing before initial training use.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A . Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

### 1.3 DEFINITIONS

- A . Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B . CxA: Commissioning Authority.
- C . Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

### 1.4 COMMISSIONING TEAM

- A . Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B . Members Appointed by Owner:
  - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
  - 2. Representatives of the facility user and operation and maintenance personnel.
  - 3. Architect and engineering design professionals.

### 1.5 OWNER'S RESPONSIBILITIES

- A . Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

### 1.6 CONTRACTOR'S RESPONSIBILITIES

- A . Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
  - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
3. Attend commissioning team meetings.
4. Integrate and coordinate commissioning process activities with construction schedule.
5. Review and accept construction checklists provided by the CxA.
6. Complete construction checklists as Work is completed and provide to the Commissioning Authority.
7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
8. Complete commissioning process test procedures.
9. Contractors, under their own direction, execute and document the prefunctional checklists and perform startup and initial checkout.

#### 1.7 COMMISSIONING AGENT RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan.
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process functional test procedures.
- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
- F. Prepare and maintain the Issues Log.
- G. Prepare and maintain completed construction checklist log.
- H. Witness systems, assemblies, equipment, and component startup.
- I. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

## **PART 2 - PRODUCTS**

### 2.1 TEST EQUIPMENT

1. All standard testing equipment required to perform startup and initial checkout and required functional testing shall be provided by the Division contractor for the equipment being tested.

### **PART 3 - EXECUTION**

#### **3.1 START-UP, PREFUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT**

1. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional testing of equipment or subsystems of the given system.
2. Start-up and Initial Checkout Plan: The CxA shall assist the contractor in developing pre-functional checklists and a detailed start-up plan for all commissioned equipment. The subcontractor responsible for the purchase of the equipment develops the full start-up plan. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.

#### **B . Execution of Prefunctional Checklists and Startup.**

1. Contractors and vendors to schedule startup and checkout with the Owner, Architect, and CxA. The performance of the prefunctional checklists, startup and checkout are directed and executed by the Sub or vendor. When checking off prefunctional checklists, signatures may be required of other subcontractors for verification of completion of their work.
2. The subcontractors vendors shall execute startup and provide the CxA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
3. Subcontractors shall clearly list any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully.
4. The installing subcontractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests and shall notify the CxA when outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report.

#### **C . FUNCTIONAL TESTING**

1. Objectives and Scope: The objective of functional testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents.
2. Functional testing shall be scheduled by the Cx after prefunctional testing is completed.
3. During the testing process, areas of deficient performance are identified and corrected.
4. Each system is to be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, and emergency shut-down operations) where there is a specified system response.
5. Subcontractors and vendors shall assist the Cx by operating equipment during functional testing and correcting deficiencies during the functional testing.
6. If during functional testing it is found an equipment or system is not operational or functioning as indicated on the completed prefunctional checklist, the functional testing is to be discontinued. The subcontractor and vendor shall correct deficiencies and re-submit a completed pre-functional checklist to the Cx. The Cx will then re-schedule the functional testing.
7. Final commissioning report will be prepared by the Cx.

END OF SECTION



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes cast-in-place concrete formwork and accessories, for the following:
  - 1. Footings and grade beams.
  - 2. Foundation walls.
  - 3. Slabs-on-grade.
  - 4. Concrete Toppings.
- B. Related Sections:
  - 1. Section 03 30 00 "Cast-In-Place Concrete".
  - 2. Section 03 20 00 "Concrete Reinforcement".

### 1.3 REFERENCES

- A. Abbreviations & Acronyms
  - 1. ACI – American Concrete Institute
- B. Reference Standards
  - 1. ACI 301-10: Specification for Structural Concrete Buildings.
  - 2. ACI 117-10: Specification for Tolerances for Concrete Construction and Materials
  - 3. ACI 347-04: Guide to Formwork for Concrete

### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Form materials and form-release agents.

### 1.5 QUALITY ASSURANCE

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301-10, "Specifications for Structural Concrete for Buildings"
  - 2. ACI 117-10, "Specification for Tolerances for Concrete Construction and Materials"

## 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. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. 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.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
  - 2. Class C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 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 (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved 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.

### 3.3 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view or to receive a rubbed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. All concrete work is subject to special inspection and testing. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency, the Owner, or the Engineer/Architect if project conditions warrant.
- C. Special Inspector Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Tests and inspections shall be in conformance with Division 1, Section "Quality Requirements".
- E. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).
- F. Continuous Field Inspection: The Independent Testing Agency shall be present at all times during the placing of structural reinforced concrete. Work shall not proceed until all inspections are completed. Prior to placing concrete, the Inspector shall inspect:
  - 1. Accuracy, configuration, and cleanliness of all formwork
  - 2. Quantity, cleanliness, and placement of all reinforcing steel.
  - 3. Testing Agency need not be present during entire reinforcing steel placing operations, provided he has inspected for conformance with the approved placement drawings prior to closing of forms or the delivery of concrete to the job site.
- G. No concrete shall be placed until placement of reinforcement steel has been inspected and approved. Provide 48 hours notice to the Inspector prior to placing concrete.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes concrete reinforcement for the following:
  - 1. Footings and grade beams.
  - 2. Foundation walls.
  - 3. Slabs-on-grade.
  - 4. Concrete Toppings.
  - 5. Concrete Masonry Units
- B. Related Sections:
  - 1. Section 03 10 00 "Concrete Forming and Accessories"
  - 2. Section 03 30 00 "Cast-In-Place Concrete"

### 1.3 REFERENCES

- A. Abbreviations & Acronyms
  - 1. ACI – American Concrete Institute
  - 2. CRSI – Concrete Reinforcing Steel Institute
- B. Reference Standards
  - 1. ACI 301-10: Specification for Structural Concrete Buildings.
  - 2. ACI 117-10: Specification for Tolerances for Concrete Construction and Materials.

### 1.4 ACTION SUBMITTALS

- A. Submit in accordance with Division 01 Section "Administrative Requirements."
- B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
  - 1. Provide details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include special reinforcement required for openings through concrete structures.
  - 2. Shop drawing re-submittals shall clearly identify all revisions to previous submittals.
    - a. Heavy ink clouded outlines (revision clouds) shall be drawn around revised areas of individual sheets.
    - b. Architect/Engineer will not review information outside of revision clouds on resubmitted drawings.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For welder
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Steel reinforcement and accessories.

## 1.6 QUALITY ASSURANCE

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301-10, "Specifications for Structural Concrete for Buildings"
  - 2. ACI 117-10, "Specification for Tolerances for Concrete Construction and Materials"
- B. CRSI Publications: Comply with the following, unless more stringent provisions are indicated:
  - 1. Manual of Standard Practice
  - 2. Documents 63 and 65.
- C. Qualifications
  - 1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

## 1.7 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: See Structural Drawings
- B. Plain-Steel Wire: See Structural Drawings
- C. Deformed-Steel Wire: See Structural Drawings

### 2.2 REINFORCEMENT ACCESSORIES

- A. Tie Wire: Minimum 16 gage, ASTM A 82, or acceptable patented system.
- B. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- C. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

- 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-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.

### 2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Defective Work: The following reinforcing steel work will be considered defective, and shall be removed and replaced by the Contractor at no additional cost to the Owner:
1. Bars with kinks or bends not shown on the drawings.
  2. Bars damaged due to bending or straightening.
  3. Bars heated for bending.
  4. Reinforcement not placed in accordance with the drawings.

### 3.2 FIELD QUALITY CONTROL

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



- B. All concrete work is subject to special inspection and testing. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency, the Owner, or the Engineer/Architect if project conditions warrant.
- C. Special Inspector Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Tests and inspections shall be in conformance with Division 1, Section "Quality Requirements".
- E. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).
- F. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Steel reinforcement welding.
- G. Reinforcing Steel Testing: Independent Testing Agency will perform the following:
  - 1. All steel bars that can be positively identified as to heat number and mill analysis shall have one tensile test bending test for each 10 tons, or fraction thereof, for all #5 bars and larger.
  - 2. All steel bars that cannot be identified shall have one tensile and one bend test made for each 2 1/2 tons, or fraction thereof, of each size and kind of reinforcing steel.
  - 3. Testing procedure shall conform to ASTM A 615.
- H. Reinforcement Welding: All shop and field welds of reinforcing steel will be inspected. The Special Welding Inspector will check the materials and equipment, the qualifications and ability of the welder, and details of construction and procedure, as well as the welds themselves. The Inspector may use gamma ray, magneflux, trepanning, ultrasonics, or any other aid to visual inspection which the Inspector may deem necessary to determine the adequacy of the welding.
- I. No concrete shall be placed until placement of reinforcement steel has been inspected and approved. Provide 48 hours notice to the Inspector prior to placing concrete.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes cast-in-place concrete, including, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings and grade beams.
  - 2. Foundation walls.
  - 3. Slabs-on-grade.
  - 4. Concrete Toppings.
- B. Related Sections:
  - 1. Section 03 10 00 "Concrete Forming and Accessories"
  - 2. Section 03 20 00 "Concrete Reinforcing"

### 1.3 REFERENCES

- A. Abbreviations & Acronyms
  - 1. ACI – American Concrete Institute
  - 2. NRMCA – National Ready Mixed Concrete Association
- B. Definitions
  - 1. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
  - 2. W/C Ratio: The ratio by weight of water to cementitious materials.
- C. Reference Standards
  - 1. ACI 301-10: Specification for Structural Concrete Buildings.
  - 2. ACI 117-10: Specification for Tolerances for Concrete Construction and Materials

### 1.4 ADMINISTRATIVE REQUIREMENTS:

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

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

#### 1.5 ACTION SUBMITTALS

- A. Submit in accordance with Division 01 Section "Administrative Requirements."
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Submit proposed mix designs at least 15 days in advance of placing operations for each concrete mixture. The submitted mix design shall include the following:
    - a. Supporting strength test data not more than 12 months old. At the Engineer's request, reports from the independent testing agencies may be required to document the test data. Reports from the independent testing agencies will be required if fly ash is used in the design mix.
    - b. Statistical analysis in compliance with ACI 301.
    - c. Gradation of fine and coarse aggregates not more than 90 days old (ASTM C 33). No substitution of aggregate type or size from those submitted will be permitted.
    - d. Proportions of all ingredients, including all admixtures added either at time of batching or at job site. Aggregate weights shall be based upon saturated surface dry conditions.
    - e. Water/cement ratio.
    - f. Slump (ASTM C 143): When high range water-reducing admixtures are used, slump before and after addition of admixture are required.
    - g. Air content of freshly mixed concrete (ASTM C 231).
    - h. Material Certificates for the following:
      - 1) Cementitious Materials
      - 2) Admixtures
    - i. Certification that all ingredients in each mix design are compatible
    - j. Locations or intended use of each mix design.
    - k. Source of all materials.
    - l. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Embedded Item Placement Drawings: Drawings indicating the location and type of plates, anchorages, or other items to be embedded in the finished concrete surfaces. Include wall elevations, slab plans, and details required to locate and install embeds.
- D. Samples: For waterstops and vapor retarder.
- E. Saw Cut Joints: Indicate proposed locations for all saw cut joints not shown on the drawings.
  - 1. Location of saw cut joints is subject to approval of the Architect.
- F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
  1. Form materials and form-release agents.
  2. Steel reinforcement and accessories.
  3. Waterstops.
  4. Curing compounds.
  5. Floor and slab treatments.
  6. Bonding agents.
  7. Adhesives.
  8. Semirigid joint filler.
  9. Joint-filler strips.
  10. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Written curing procedure, including curing procedures for hot- and cold-weather placement.
- F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

#### 1.7 QUALITY ASSURANCE

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  1. ACI 301-10, "Specifications for Structural Concrete for Buildings"
  2. ACI 117-10, "Specification for Tolerances for Concrete Construction and Materials"
- B. CRSI Publications: Comply with the following, unless more stringent provisions are indicated:
  1. Manual of Standard Practice
  2. Documents 63 and 65.
- C. Qualifications
  1. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

2. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
    - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
  3. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
    - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
    - b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Coordinate chemical and adhesion compatibility of curing compounds used for curing concrete with coatings, stains, paints, liquid flashings, sealers, waterproofing membranes, joint sealants and other materials that penetrate, adhere to or otherwise come into contact with concrete surfaces that are specified in other sections.
- F. Batch Tickets: Provide batch tickets for review by inspector for each truckload of concrete used in the work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of cement and water introduced.
- G. Concrete Finishing and Curing:
1. Obtain each type, composition, and variety of liquid membrane-forming curing compound used for the Project from the same manufacturer.
  2. Products from more than one approved manufacturer may be used for different applications, however all products for like applications shall be by the same manufacturer.
  3. Liquid membrane curing compound manufacturer qualifications: Obtain materials only from a manufacturer that will send an experienced technical field representative to the Project site before the start of work to verify existing conditions, and during the execution of work to perform manufacturer's field services.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Store materials in accordance with ACI 301. Admixtures which have been in storage at the project site for longer than six months or which have been subjected to freezing shall not be used, unless retested and proven to meet the specified requirements.
  - B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.
- 1.9 FIELD CONDITIONS
- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  2. Products: Subject to compliance with requirements, provide one of the products specified.
  3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type II Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class C.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
    - c. Silica Fume: ASTM C 1240, amorphous silica.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, graded. Provide aggregates from a single source.
1. Unless maximum aggregate size is listed specifically under "Project Mix Requirements," the maximum aggregate size shall not exceed:
    - a. Three-fourths of the minimum clear spacing between reinforcing bars.
    - b. One-fifth of the narrowest dimension between the sides of the forms.
    - c. One-third of the thickness of the slabs or toppings.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

## 2.3 ADMIXTURES

### A. General

1. Admixtures certified by manufacturer to contain not more than 0.05 percent water-soluble chloride ions by mass of cementitious material. Do not use admixtures containing calcium chloride or thiocyanate.
2. Where more than one admixture is used in the mix, furnish manufacturer's certification to the Architect that the admixtures to be used are compatible in combination with the cement and aggregates.
3. Accelerating admixtures shall not be used.

B. Air-Entraining Admixture: ASTM C 260.

C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

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

A. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

#### 1. Products:

- a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
- b. BASF Construction Chemicals – Building Systems; Rheocrete CNI.
- c. Euclid Chemical Company (The); Eucon, CIA.
- d. Grace Construction Products, W.R. Grace & Co.; DCI.
- e. Sika Corporation; Sika CNI.

A. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

#### 1. Products:

- a. BASF Construction Chemicals – Building Systems; Rheocrete 222+.
- b. Cortec Corporation; MCI [2000] [2005NS].
- c. Grace Construction Products, W.R. Grace & Co.; DCI-S.
- d. Sika Corporation; FerroGard-901.

## 2.4 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.5 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513 for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
1. Profile: As indicated.
  2. Dimensions: 6 inches by 3/8 inch thick; nontapered.
- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

## 2.6 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ChemMasters; Chemisil Plus.
    - b. ChemTec Int'l; ChemTec One.
    - c. Conspec by Dayton Superior; Intraseal.
    - d. Curecrete Distribution Inc.; Ashford Formula.
    - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
    - f. Edoco by Dayton Superior; Titan Hard.
    - g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
    - h. Kaufman Products, Inc.; SureHard.
    - i. L&M Construction Chemicals, Inc.; Seal Hard.
    - j. Meadows, W. R., Inc.; LIQUI-HARD.
    - k. Metalcrete Industries; Floorsaver.
    - l. Nox-Crete Products Group; Duro-Nox.
    - m. Symons by Dayton Superior; Buff Hard.
    - n. US SPEC, Division of US Mix Products Company; US SPEC Industraseal.
    - o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products:
    - a. Dayton Superior Corporation; Sure Film.
    - b. Euclid Chemical Company (The); Eucobar.



- c. Sika Corporation, Inc.; SikaFilm.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

## 2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber
- A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  1. Fly Ash: 25 percent.
  2. Combined Fly Ash and Pozzolan: 25 percent.
  3. Ground Granulated Blast-Furnace Slag: 50 percent.
  4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
  5. Silica Fume: 10 percent.
  6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
  7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Slump: 4 inches plus or minus 1 inch
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Concrete mix design shall comply with the requirements of the structural drawings.

## 2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. Install connection plates, angles, or other embedded items flush with concrete surface and at accurate locations per the approved embedded item placement drawings required by Part 1, "Submittals," section.

### 3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  - 2. Face laps away from exposed direction of concrete pour.
  - 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  - 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  - 7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

### 3.3 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  5. Space vertical joints in walls at maximum of 30-foot spacing. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  8. Provide roughened surfaces at joints where shown on the drawings. Roughen to a full amplitude of approximately 1/4-inch.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- 3.4 WATERSTOP INSTALLATION
- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

### 3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view or to receive a rubbed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
1. Apply scratch finish to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

- E. Broom Finish: Apply a broom finish to exterior concrete, steps, ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic rout. Coordinate required final finish with Architect before application.

### 3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### 3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm).



- Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. All concrete work is subject to special inspection and testing. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency, the Owner, or the Engineer/Architect if project conditions warrant.
- C. Special Inspector Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Tests and inspections shall be in conformance with Division 1, Section "Quality Requirements".
- E. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).
- F. Continuous Field Inspection: The Independent Testing Agency shall be present at all times during the placing of structural reinforced concrete. Work shall not proceed until all inspections are completed. Prior to placing concrete, the Inspector shall inspect:
  - 1. Accuracy, configuration, and cleanliness of all formwork
  - 2. Quantity, cleanliness, and placement of all reinforcing steel.
  - 3. Testing Agency need not be present during entire reinforcing steel placing operations, provided he has inspected for conformance with the approved placement drawings prior to closing of forms or the delivery of concrete to the job site.
- G. Inspections:
  - 1. Headed bolts and studs.
  - 2. Verification of use of required design mixture.
  - 3. Concrete placement, including conveying and depositing.
  - 4. Curing procedures and maintenance of curing temperature.
- H. No concrete shall be placed until placement of reinforcement steel has been inspected and approved. Provide 48 hours notice to the Inspector prior to placing concrete.
- I. Concrete Sampling: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  - 5. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  - b. At the Contractor's expense and direction, cast and field-cure standard cylinder specimens as may be required for construction. Number of specimens and testing age shall be determined by the Contractor based on construction sequence requirements.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
- a. Test field-cured specimens at the Contractor's direction.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Linear Shrinkage Tests: Test for linear shrinkage in accordance with ASTM C 157 (air storage method for 28 days. Take a minimum of 3 test samples from each mix, at the Project Representative's direction, of concrete for elevated slabs and beams. Take samples at truck and discharge end of pumped mix. Consistency of the concrete must not be altered after test samples have been taken.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- J. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.
1. Finish surfaces to the following tolerances, for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    - b. Specified overall values of flatness, F(F) 30; with minimum local values of flatness, F(F) 24; for suspended slabs.
    - c. Specified overall values of flatness, F(F) 40; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for concrete receiving polished concrete finish.

3.13 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

**END OF SECTION**

**PART 1 - GENERAL**

1.1 SECTION INCLUDES

- A . Polished concrete finish on new cast-in-place concrete work.

1.2 RELATED REQUIREMENTS

- A . 03 30 00 - Cast-in-Place Concrete.

1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures, and coordinating and scheduling required with related work.

1.4 SUBMITTALS

- A . Qualification Data: For installer.
- B . Samples: Submit two, 12 inch square samples, illustrating aggregate size, color and the extremes of color range.

1.5 QUALITY ASSURANCE

- A . Installer's Qualifications:
  - 1. Certified Polished Concrete installer.
  - 2. Certified PCI or CSDA installer.
- B . Perform Work in accordance with ACI 301 and ACI 303R.
  - 1. Maintain one copy of each document on project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A . Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B . Storage:
  - 1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
  - 2. Keep materials from freezing.
- C . Handling: Protect materials during handling and application to prevent contamination or damage.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Polished Concrete Floor: Dry or wet grinding and polishing with various size grit metal-bonded and resin-bonded diamonds and application of concrete densifier by a IPCI certified polished concrete installer.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Wet Dynamic Coefficient of Friction (DCOF): Not less than 0.42 as tested in accordance with ANSI/NFSI B101.3 Wet DCOF of Common Hard-Surface Floor Materials.
- B. Finished floor surface to have a minimum hardness rating of 6.5 Mohs (Hardness Pencil Test) in accordance with ASTM D3363.

### 2.3 MATERIALS

- A. (SC-1) Polished and Sealed Concrete:
  - 1. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
    - a. Basis of Design: Consolideck by PROSOCO, Inc. or approved equal.
  - 2. Penetrating Liquid Floor Sealer: Clear, provides water, oil, and stain repellency. VOC content <100 g/L.
    - a. Basis of Design: Consolideck Concrete Protector SB by PROSOCO, Inc. or approved equal.
  - 3. Penetrating Hardener Densifier:
    - a. Basis of Design: Consolideck LS by PROSOCO, Inc. or approved equal.
- B. (SC-2) Hard Troweled and Sealed:
  - 1. Basis of Design: RetroPlate Concrete Polishing System by CureCrete Distribution Inc., as provided by Diamond - S Polished Concrete Inc.

### 2.4 CONCRETE MIX

- A. Concrete mix design is specified in Section 03 30 00.

### 2.5 EQUIPMENT TO BE USED FOR INSTALLATION

- A. Floor Grinder: Type: Multi-orbital, planetary-action, opposing-rotational, diamond-headed floor grinder.
- B. Vacuum System: Ruwac / Ermator (or equivalent) model as determined by installer to perform required dust extraction during grinding and polishing of concrete floor. Diamond Tooling for Initial Grinding, and Preparing Floor for Polishing:
  - 1. 60-grit metal-bonded diamonds (or equivalent).
- C. Diamond Tooling for Polishing Concrete:
  - 1. 200-grit resin-bonded diamonds (or equivalent).

## 2.6 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Examine floor to receive polished concrete floor finish.
- B . Notify Architect of conditions that would adversely affect installation or subsequent use.
- C . Verify the Following for Concrete Floors:
  - 1. Floor Finish:
    - a. Slabs and flatwork shall be placed and finished monolithically.
    - b. Strike off and screed slabs to true, plane surfaces at required elevations.
    - c. Thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface.
    - d. Power trowel with no hand finishing.
    - e. Surface should not be burned or burnished due to excessive troweling.
    - f. Imprints are not acceptable.
  - 2. Floor and Joints:
    - a. Free of debris and excessive dirt, dust, clay, and mud.
    - b. Dry.
  - 3. Concrete Curing: Minimum 8 days water cured or dissipating curing compound applied.
  - 4. Concrete Adjacent to Floor Penetrations: Troweled flat and level with surrounding concrete.
  - 5. Concrete Adjacent to Drains, clean-outs, etc: Finish level to the top of the structure.

### 3.2 PREPARATION

- A . Protection: Protect surrounding areas and adjacent surfaces from the following:
  - 1. Minimal accumulation of dust from grinding and polishing.
  - 2. Contact with overspray of concrete densifier.
- B . Surface Preparation: Prepare surfaces in accordance with installer's instructions.
- C . Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants which could adversely affect installation of polished concrete floor system.

### 3.3 INSTALLATION

- A . Install polished concrete floor system in accordance with installer's instructions at locations indicated on the Drawings.

- B . Sequence with course to fine grit using dry method:
  - 1. Comply with manufacturer's recommended polishing grits for each sequence to be the following:
    - a. Class B per Concrete Polishing Council.
    - b. Fine Aggregate (Salt and Pepper).
    - c. 1/16-inch surface cut depth.
    - d. Appearance: Fine aggregate exposure with little or no medium exposure at random locations.
  - 2. All concrete surfaces shall be as uniform in appearance as possible.
- C . Polished Concrete Floor System:
  - 1. Preparation Step:
    - a. For exposure of standard aggregate: Open-up concrete to accept concrete densifier by grinding with 60-grit metal-bonded diamonds.
  - 2. Apply concrete densifier to deeply saturate floor.
  - 3. Remove residue of concrete densifier dried on floor surface by grinding with 80-grit metal-bonded diamonds.
  - 4. Floor Closure Polishing:
    - a. Remove 200-grit resin-bonded diamond scratches by grinding with 400-grit resin-bonded diamonds.
    - b. Apply protective sealer.
    - c. High speed burnish protective sealer with diamond impregnated pad.

### 3.4 TESTING

- A . Test each concrete surface in accordance with ANSI/NFSI B101.3 to confirm compliance with performance criteria.

### 3.5 FIELD QUALITY CONTROL

- A . Inspect completed polished concrete floor system with Owner, Contractor, Architect, and Installer.
- B . Review procedures with Architect to correct unacceptable areas of completed polished concrete floor system.

### 3.6 PROTECTION

- A . Protect completed polished concrete floor system from damage until Substantial Completion.
  - 1. Do not allow vehicle and pedestrian traffic on unprotected floor.
  - 2. Do not allow construction materials, equipment, and tools on unprotected floor.
- B . Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed polished concrete floor system.



C . Repair damaged areas of completed polished concrete floor system to satisfaction of Architect.

### 3.7 SCHEDULE

A . **(CONC-1)** Polished Concrete:

1. Fine Aggregate Exposure: Mottled salt-and-pepper coarse aggregate exposure.
2. Additive Color Dye: None.
3. Sheen: Satin – 200 grit.
4. Sealer: Standard as indicated above.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Concrete Masonry Units (CMU).
- B . Installation Materials.

### 1.2 RELATED REQUIREMENTS

- A . 07 21 00 - Thermal Insulation: For insulation components of masonry systems.
- B . 07 25 00 - Weather Barriers: For components of masonry systems.
- C . 07 62 00 - Sheet Metal Flashing and Trim: For sheet metal components of masonry systems.
- D . 07 90 05 - Joint Sealers.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 013000 - Administrative Requirements.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer, fabricator, and installer.
- B . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
  - 1. Include material properties and test reports substantiating compliance with project requirements.
  - 2. Size Variation Data: For brick or block.
  - 3. Efflorescence Rating: In accordance with ASTM C67: For exposed brick.
  - 4. Durability: In accordance with ASTM C67; 50 cycles of freezing and thawing.
  - 5. Strength: provide data and calculations establishing average net-area compressive strength for masonry units used in structural assemblies.
  - 6. Steel reinforcing bars.
  - 7. Joint reinforcement.
  - 8. Anchors, ties, and metal accessories.

9. Cementitious Materials include:
  - a. Brand, type, and name of manufacturer.
  - b. Description of mix design and proportions of ingredients.
- D. Shop Drawings: Indicate required flashings, control joints, and expansion joints, sealing at openings, projections, and penetrations.
  1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
  3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
  4. Detail Drawings: Submit elevation or overall drawings at 1/2 inch equal to 1 foot scale and detail drawings of a minimum 1-1/2 inch equal to 1 foot scale showing:
    - a. Bar splice locations.
    - b. Wall elevations exposed to view indicating the location of all cut masonry products.
    - c. Location and diagrams of all bent bars.
    - d. Wall dimensions, bar clearances, and all openings greater than one masonry unit in area.
    - e. Control joints.
- E. Samples: Full units to illustrate range of color and texture.
- F. Certificate: When using bricks containing contaminated soil: Certification by manufacturer that the hazardous waste is neutralized by the manufacturing process and that no additional pollutants will be released.
- G. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods for cementitious materials and accessories.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Data: For users operation and maintenance of system including:
  1. Methods for maintaining system's materials and finishes.
  2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.
  1. Certified member in good standing with the Washington State Conference of Mason Contractors (WSCMC) or Mason Contractors Association of Oregon (MCAO).

## 1.6 MOCKUP

- A . Construct mockup based on approved samples.
  - 1. Build mockup on a properly designed concrete foundation.
  - 2. Provide one panel for each combination of unit color, bond pattern, and mortar color.
  - 3. Configure to represent all wall elements.
  - 4. Minimum Size: 8 feet x 4 feet.
  - 5. Show color range, texture range, mortar color, joint tooling, bond pattern, cleaning, and quality of workmanship.
  - 6. Demonstrate veneer anchors, clear cavity maintenance products, techniques and accessories.
  - 7. Demonstrate grouting including wythes, reinforcing bar support, grouting of cells, bond beams, lintels, and collar joints.
  - 8. Apply sealer.
  - 9. Maintain mockup on site as example of level of quality and details for remainder of work.
  - 10. If the sample panel is not included in the actual masonry work; demolish and remove from site after the masonry work for the project has been accepted.
- B . Locate where directed.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A . Deliver, store, and handle material to avoid chipping, breakage, and contact with soil or contaminating materials.
- B . Do not ship facing units to site until Architect approves sample panel.
- C . Store masonry units in accordance with ASTM C90.
- D . Store moisture sensitive materials in dry, weathertight enclosures.

## 1.8 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

## 1.9 ENVIRONMENTAL CONDITIONS

- A . General: Conform to ASTM D1790 for hot and cold weather masonry construction.
- B . Hot Weather:
  - 1. Take the following precautions if masonry is erected when:
    - a. The ambient air temperature is more than 99 degrees F. (37 degrees C.) in the shade and the relative humidity is less than 50 percent.
    - b. The ambient air temperature exceeds 90 degrees F. (30 degrees C.) and the wind velocity is more than 8 mph (13 km).

2. Shade masonry materials from direct sunlight; spread mortar beds no more than 4 feet ahead of masonry; set masonry units within one minute of spreading mortar; and after erection, protect masonry from direct exposure to wind and sun for 48 hours.
- C. Cold Weather:
1. Take the following precautions if masonry is erected when:
    - a. Ambient temperature or mean daily air temperature falls below 40 degrees F. (4 degrees C.)
    - b. Temperature of masonry units is below 40 degrees F. (4 degrees C.)
  2. Provide supplemental heat to achieve required ambient temperature of air and materials.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Exterior assemblies of concrete masonry units including veneer concrete masonry units and installation materials.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Blend brick to produce a uniform appearance when installed and avoid an observable banding or layering of colors or textures.
- B. Follow details and specifications for size, layout, and grouting of structural unit masonry walls. Coordinate net-area compressive strength requirements with Architect.
1. Determine net-area compressive strength as follows:
    - a. Unit Strength Method: Compressive strength of units and mortar per Tables 1 and 2 in ASTM D1790 / ASTM C1405 / TMS 402/602.
    - b. Prism Method: Test masonry prisms in accordance with ASTM C1314.

### 2.3 GENERAL

- A. Obtain masonry units from a single manufacturer for each type of unit used.
- B. Obtain Cementitious materials from a single manufacturer for each type used.

### 2.4 CONCRETE MASONRY UNITS (CMU)

- A. Complying with ASTM C652.
- B. Compressive strength for each type of unit required per ASTM C140/C140M.
- C. Aggregates: Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units that comply with the following requirements when tested for stain-producing iron compounds in accordance with ASCE 6.
1. By visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.
- D. Slag: Comply with ASTM C989/C989M per project requirements.

- E . Cement: Low alkali content.
- F . Unit Sizes: As indicated. Standard units are nominally 4, 6, 8, 10, and 12 inch thick by 8 inches tall x 16 inches long.
- G . Face Brick:
  - 1. ASTM C216. Grade: SW. Type: FBS.
- H . Hi-R Block:
  - 1. ASTM C90, Grade N or S, Type 1 or Type II.
  - 2. 8-inches x 16-inches face (nominal); 2 cross webs.
  - 3. 2.5-inch insulation insert.

## 2.5 CEMENTITIOUS MATERIALS

- A . Portland Cement: Complying with ASTM C150/C150M.
- B . Masonry Cement: Complying with ASTM C91/C91M.
- C . Sand: Complying with ASTM C144.
- D . Water: Clean, potable, and free from substances which could adversely affect the mortar.
- E . Fly Ash: Complying with ASTM C641, Class F.
  - 1. Cement-lime mortar: 40 percent maximum with type IP cement.
- F . Mortar Coloring: Colorant specifically made for use in masonry mortar.
  - 1. Added to the mortar used for exposed masonry surfaces to produce a uniform color.
  - 2. Quantity of pigment required to match approved samples.
  - 3. Color: \_\_\_\_\_.
- G . Cold Weather Accelerating Admixture: Complying with ASTM C494/C494M non-corrosive, containing less than 0.2 percent chlorides.
- H . Masonry Mortar: Complying with ASTM C270.
  - 1. Mortar Types: Conform to the proportion specification of ASTM C270.
    - a. Type M cement-lime mortar: 1 part cement, 1/4 part lime, and 3-3/4 parts aggregate.
      - 1) Average compressive strength at 28 days: Not be less than 2500 psi.
    - b. Type S cement-lime mortar: 1 part cement, 1/2 part lime, and 4-1/2 parts aggregate.
    - c. Type N cement-lime mortar: 1 part cement, 1 part lime, and 6 parts aggregate.
  - 2. Air-Content: When structural reinforcement is incorporated.
    - a. Cement-lime mortar: 12 percent maximum.
    - b. Masonry cement mortar: 18 percent maximum.
  - 3. Admixture: Liquid, integral water-repellent, bond-enhancing admixture for masonry mortar.

- a. Basis of Design: DRY-BLOCK Mortar Admixture by GCP Applied Technologies.

I. Grout:

- 1. General: Comply with ASTM C476, with minimum compressive strength of 2,000 psi when tested in accordance with ASTM C1019.
  - a. Slump: 8 to 10 inches as measured by ASTM C143/C143M.
  - b. Grout Mix: Provide factory-blended hydraulic cement-based products containing the following minimum components:
    - 1) Portland cement or blended cement: ASTM C150/C150M Types I, IA, II, IIA, III or IIIA.
    - 2) Portland Cement or Blended Cement: ASTM C593 Types IS, IS(MS), IS-A, IS-A(MS), IP, or IP-A.
    - 3) Portland cement or Blended Cement: ASTM C595/C595M Types GU, HE, MS, or HS.
    - 4) Fly Ash: ASTM C618.
    - 5) Aggregate: ASTM C404.
    - 6) Water: Clean and free from deleterious acids, alkalies, and organic matter.
  - c. Coarse Grout: Adjust aggregate proportions as necessary to provide an evenly graded mix which will be easily pumped, with coarse aggregate content no greater than maximum specified in the proportion specifications of ASTM C476.
  - d. Grout Barriers for vertical cores: Made of fine mesh wire, fiberglass, or expanded metal.

J. Packaged Mortar Material:

- 1. Complying with ASTM C1142, Types RN, RS, and RM.
- 2. Exceeds performance of the field-mixed mortar design.

K. Packaged Dry Material for Grout for Masonry:

- 1. Complying with ASTM C476 with the addition of water only.
- 2. Exceeds performance of the field-mixed grout design.

## 2.6 ACCESSORIES

A. Ties and Anchors:

- 1. Provide wire or sheet metal ties and anchors that are made from materials that comply with one of the following:
  - a. Stainless-Steel Wire: AISI Type 304 or Type 316
  - b. Hot-Dip Galvanized, Carbon Steel Wire: ASTM A153/A153M, Class B-2
  - c. Epoxy Coated: ASTM C1157/C1157M Class C Epoxy, greater than 20 mils thick.
- 2. Wire Ties:
  - a. General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8 inch cover on outside face.
  - b. Wire: Fabricate from 3/16 inch minimum diameter wire.

- c. Tie Section: Provide rectangular-shaped wire ties with closed ends not less than 4 inches wide, or provided triangular-shaped wire ties with outer ends bent to extend 2 inches parallel to face of veneer.
  3. Adjustable Anchors:
    - a. Provide ties that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
    - b. Structural Performance Characteristics: Capable of withstanding specified building design loads in both tension and compression without deforming or developing play in excess of 1/16 inch.
    - c. Type: Provide double eye-and-pintle type wire ties, or provide triangular wire ties with slotted sheet metal connector.
    - d. Adjustability: Ties adjustment: be limited to 1-1/4 inches.
  4. Seismic Masonry-Veneer Ties:
    - a. Provide ties with a connector section designed to engage a continuous horizontal wire embedded in the veneer mortar joint.
  5. Fasteners:
    - a. Provide mechanical fasteners to secure masonry ties to backup wall substrate.
    - b. Material: Provide fasteners of the same corrosion resistant material as masonry ties and anchors.
- B. Joint Reinforcement:
  1. Factory fabricated from steel wire conforming to ASTM A1064/A1064M, welded construction.
    - a. Tack welding will not be acceptable in reinforcement used for wall ties.
      - 1) Wire with a zinc coating conforming to ASTM A153/A153M, Class B-2.
      - 2) Wires with a minimum gauge per project requirements.
      - 3) Reinforcement: Ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units.
      - 4) Joint reinforcement: Place a minimum of 5/8 inch cover from either face. The distance between cross wires will not exceed 16 inches. Furnish Joint reinforcement for straight runs in flat sections not less than 10 ft. long.
      - 5) Joint reinforcement provide with factory formed corners and intersections.
- C. Bar Positioners:
  1. Use to prevent displacement of reinforcing bars during the course of construction.
  2. Provide factory fabricated from 9 gauge steel wire or equivalent, and coated with a hot-dip galvanized finish.
  3. Allow no more than one wire to cross the cell.
  4. Telescoping bar positioners: Manufactured from AISI 1065 spring steel and coated in accordance with ASTM B633.
- D. Preformed Control Joints:
  1. Rubber or PVC material. Provide with corner and tee accessories, fused joints Control Joint.



E . Expansion Joint Materials:

1. Backer rod and sealant adequate to accommodate joint compression equal to 50 percent of the width of the joint with backer rod of compressible type suitable to prevent three-sided adhesion. See Section 07 90 05 - Joint Sealers.
2. Expansion Joint Material compression up to 50 percent; manufactured of closed cell neoprene conforming to ASTM D1056, RE41:
  - a. Adhesive on one side and 1/4 inch thick at Horizontal Joints.
  - b. No adhesive and 3/8 inches thick at Vertical Joints.

F . Sheet Metal Flashing:

1. See 07 62 00 - Sheet Metal Flashing and Trim.

G . Weep Hole Ventilators:

1. Prefabricated plastic, blocking sized to form the proper size opening in head joints.
2. Provide aluminum and plastic inserts with grill or screen-type openings designed to allow the passage of moisture from cavities and to prevent the entrance of insects.
3. Ventilators: Size to match modular construction with a standard 3/8 inch mortar joint.

H . Cavity Mortar Control:

1. Provide factory-manufactured synthetic mortar netting comprised of high-density polyethylene (HDPE) strands woven into a 90 percent open mesh. Profiled as a dovetail with alternating heights to prevent mortar droppings from restricting weep.

I . Cleaning Solution:

1. Non-acidic, not harmful to masonry work or adjacent materials.
2. Basis of Design: Sure Klean 600 Detergent by ProSoCo or a comparable product by one of the following:
  - a. Evonik Corporation.
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

J . Brick Sealer:

1. See Section 07 19 00 - Water Repellents.

K . Water Repellent:

1. Clear-drying, spray-applied, vertical grade, penetrating water repellent consisting of a concentrated blend of silanes and oligomeric alkoxy siloxanes specifically for use with porous unit masonry. Active content not less than 40 percent. VOC content conform to thresholds set forth by all federal, state, local jurisdictions, and sustainable certificate requirements if sought.

L . Anti-Graffiti Coatings:

1. Clear-drying, spray-applied, water-based silicone emulsion for weatherproofing concrete and graffiti control for block and other porous masonry materials. Active content not less than 6 percent. VOC content conform to thresholds set forth by all federal, state, local jurisdictions, and sustainable certificate requirements if sought.

M . Graffiti Cleaner:

1. Solvent based, multi-surface graffiti remover free of halogenated solvents, formulated for masonry substrates.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A . Clean substrate free of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch.
- B . Sandblast if necessary to remove laitance from pores and to expose the aggregate.
- C . Ensure that exterior sheathing and weather-resistive air barriers are installed and transitioned per the project documents prior to erecting masonry units.
- D . Do not compromise or otherwise harm the continuity of a continuous air and weather resistive barrier system specified in Section 07 25 00 - Weather Barriers.
- E . Provide continuous semi-rigid or rigid insulation complying with Section 07 21 00. Formwork fit tightly around penetrations and masonry anchors.
- F . Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION - GENERAL

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in the bond pattern per project requirements. Adjust each unit to its final position while mortar is still soft and plastic.
- C . Remove clean and re-lay units that have been disturbed after the mortar has stiffened, with fresh mortar. Keep free from mortar and other debris air spaces, cavities, chases, expansion joints, and spaces to be grouted.
- D . Select units used at the exposed masonry surface from those having the least amount of chipped edge or other imperfections detracting from the appearance of the finished work.
- E . Keep units being laid and surfaces to receive units free of water film and frost. Mortar for veneer wythes: Bevel and slope toward the center of the wythe from the cavity side.
- F . Shove units into place so that the vertical joints are tight.
- G . Completely fill vertical joints of brick and the vertical face shells of concrete masonry units with mortar, except where indicated at control, expansion, and isolation joints
- H . Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted.

- I. Unfinished Work:
  - 1. Step back unfinished work for joining with new work. Tothing may be resorted to only when specifically approved. Remove loose mortar and thoroughly clean the exposed joints before laying new work.
  
- J. Cutting and Fitting: Use full units of the proper size wherever possible. Use power masonry saws and skilled masonry mechanics for cutting and fitting, including that required to accommodate the work of others.
  - 1. Concrete masonry units may be cut wet or dry.
  - 2. Dry wet cut units, before being placed in the work. Dry to the same surface-dry appearance as uncut units being laid.
  - 3. Cut edges clean, true, and sharp.
  - 4. Openings in the masonry: Make carefully so that wall plates, cover plates, or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints.
  - 5. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.
  
- K. Jointing: Tool joints when the mortar is thumbprint hard. Tool horizontal joints last. Brush joints to remove all loose and excess mortar. Mortar joints finishes:
  - 1. Flush Joints:
    - a. Flush cut: Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas.
    - b. Make by cutting off the mortar flush with the face of the wall.
    - c. Use at joints in unparge masonry walls below grade.
    - d. Use for architectural units, such as fluted units. Completely fill both the head and bed joints.
  - 2. Tooled Joints (slightly concave):
    - a. Use at joints in exposed exterior and interior masonry surfaces.
    - b. Tool with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit.
    - c. Perform so that the mortar is compressed and the joint surface is sealed.
    - d. Use a jointer of sufficient length to obtain a straight and true mortar joint.
  - 3. Door and Window Frame Joints:
    - a. On the exposed interior side of exterior frames, rake to a depth of 3/8 inch, joints between frames and abutting masonry walls.
    - b. On the exterior side of the exterior frames, rake to a depth of 3/8 inch, joints between frames and abutting masonry walls.
  - 4. Joints Between Dissimilar Materials:
    - a. Seal joints between masonry and dissimilar materials with backer rod and sealant, unless otherwise directed by EOR.
  - 5. Joint Widths:
    - a. Brick joint widths are the difference between the actual and nominal dimensions of the brick in either height or length.

b. Brick expansion joint widths: As indicated.

L. Embedded Items:

1. Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar.
2. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses.
3. Fully embed anchors, ties and joint reinforcement in mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout.

M. Joint reinforcement:

1. Install joint reinforcement at 16 inches on center or as indicated. Lap reinforcement not less than 6 inches.
2. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement to provide not less than 5/8 inch cover to either face of the unit.

N. Expansion joints:

1. Provide joints subject to movement (seismic, thermal, shrinkage, etc.) as indicated.
2. Provide continuous vertical joints where designed for movement, including through bond beams.
3. In single wythe exterior masonry walls, provide open control joints with backer rod and sealant. Install sealant per Section 07 90 05 - Joint Sealers.
4. Rake exposed interior control joints to a depth of 1/4 inch.
5. Cut concealed control joints flush.

### 3.4 ANCHORING MASONRY VENEERS

A. General: Strictly conform to intervals and methods indicated.

1. Anchorage to Concrete: Use manufacturer's pre-engineered concrete fastener.
2. Anchorage to Structural Steel: Use manufacturer's pre-engineered, self-tapping fastener. Ensure fastener penetrates through cross-section of steel member a minimum of 3/8 inch.
3. Anchorage to Wood: Use anchor manufacturer's pre-engineered, self-drilling fastener. Ensure fastener engages into framing members / solid blocking square and at depth indicated.

B. Spacing: Space anchors as indicated, but not more than:

1. Non-seismic:
  - a. 18 inches on center vertically and 32 inches on center horizontally, with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of all wall openings, and at intervals not exceeding 36 inches around the perimeter.

2. Seismic:
  - a. 18 inches on center vertically and 24 inches on center horizontally, with not less than 1 anchor for each 2.0 sq. ft. of wall area. Install additional anchors within 12 inches of all wall openings, and at intervals not exceeding 24 inches around the perimeter.
- C. Position: Position ties to extend at least halfway through veneer but with at least 5/8 Inch cover on outside face.

### 3.5 FIELD QUALITY CONTROL

- A. Testing:
  1. Mortar Test: For each mix type required.
    - a. Compressive strength: ASTM C109/C109M.
    - b. Water retention: ASTM A899.
    - c. Air content: ASTM C91/C91M.
  2. Grout Test: Compressive strength for each mix required per ASTM C1019.
- B. Tolerances:
  1. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Square corners unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, lay masonry within the following tolerances.

### 3.6 CLEANING

- A. Remove excess mortar and grout from surface units.

### 3.7 PROTECTION

- A. Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

### 3.8 MASONRY WATER REPELLENT AND GRAFFITI CONTROL

- A. Strictly conform to manufacturer's published instructions prior to commencement of sealer application.
- B. Ensure sealers will not promote a deleterious effect on adjacent wall system components.
- C. Protect adjacent areas and finishes not intended to receive masonry sealers. Do not permit sealer to run off masonry onto glazing, fixtures, flashings, or joint sealants. Ensure joint sealants have adequately cured or are protected as required prior to application of sealers.
- D. Dilute sealers with clean, potable water with mixing vessels free of contaminants. Apply solution to masonry surfaces immediately after mixing.
- E. Install sealers "wet-on-wet" to a visibly dry and absorbent surface.
- F. Spray Application: Saturate starting from bottom, creating a 4 to 8 inch rundown below contact point. Allow first application to penetrate for a minimum of 3 minutes. Resaturate.

- G . Roller Application: Saturate surface in a uniform manner. Allow first application to penetrate for a minimum of 3 minutes. Brush out heavy runs.
- H . Protect treated surfaces from rain for 4 hours until visibly dry.
- I . Clean tools and equipment immediately with soap and warm water.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

- B. Related Requirements:

1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.
2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

### 1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
  3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
  1. Decorative CMUs, in the form of small-scale units.

2. Pre-faced CMUs.
3. Colored mortar.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Pre-faced CMUs.
3. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

## 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

1. Masonry units.
  - a. Include material test reports substantiating compliance with requirements.
2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

## 1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.



- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

#### 1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry either of the following methods:
    - a. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
    - b. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

### 2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

### 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
  - 3. Provide specially formed concrete block shapes at Hi-R CMU walls where indicated on plan.

- B. Integral Water Repellent: Provide units made with integral water repellent for units in apparatus bay, apparatus bay support spaces, and units exposed to the exterior.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - 1) ACM Chemistries, Inc.; RainBloc.
      - 2) BASF Aktiengesellschaft; Rheopel Plus.
      - 3) Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.
- C. Standard CMUs: ASTM C 90.
1. Density Classification: Normal weight
  2. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
  3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- 2.5 Hi-R Wall System: Molded polystyrene inserts assembled in specially formed concrete block prior to delivery to site.
- A. Insulation: ASTM C578, CBIS Korfil Molded Polystyrene Unit Masonry Insulation
1. Density: 1.3 lbs. per cubic foot.
- B. Thermal Characteristics:
- 2.6 MASONRY LINTELS
- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- 2.7 MORTAR AND GROUT MATERIALS
- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
- E. Mortar Cement: ASTM C 1329/C 1329M.

- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products: subject to compliance with requirements, one of the following:
    - a. Davis Colors: True Tone Mortar Colors.
    - b. Lanxess Corporation: Bayferrox Iron Oxide Pigments.
    - c. Solomon Colors, Inc.: SGS Mortor Colors.Mixes in "Colored Cement Products" Paragraph below allow better control of color than job-mixed colored mortar. If retaining, also retain paragraphs above that specify materials included in the mixes retained below.
- G. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  3. White-Mortar Aggregates: Natural white sand or crushed white stone.
  4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C 404.
- I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ACM Chemistries, Inc.; RainBloc for Mortar.
    - b. BASF Corporation, Construction Chemicals; Rheopel Mortar Admixture.
    - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- K. Water: Potable.

## 2.8 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: See Structural Drawings
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

## 2.9 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.

- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82, with ASTM A 153, Class B-2 coating.
  2. Stainless-Steel Wire: ASTM A 580, Type 304.
  3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, with ASTM A 153, Class B coating.
  4. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304.
  5. Steel Plates, Shapes, and Bars: ASTM A 36.

#### 2.10 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
- B. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A with ASTM A 563 (ASTM A 563M) hex nuts and, where exposed to earth or weather, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors as indicated in the drawings.
1. Load Capacity: As indicated in the drawings and per the requirements of the local jurisdiction and ICC-ES valid report.
  2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.
  3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M)

#### 2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

#### 2.12 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
  2. Use portland cement-lime mortar unless otherwise indicated.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270 and Articles 2.1 and 2.6A of TMS 602/ACI 530.1/ASCE 6. Provide the following types of mortar for applications stated unless another type is indicated.
1. For masonry below grade or in contact with earth, use Type M.
  2. For reinforced masonry, use Type S.
  3. Mortar shall achieve the following minimum compressive strength values at 28 days:
    - a. Type M: 2,500 psi
    - b. Type S: 1,800 psi
    - c. Provide water-repellent admixture in all mortar at exterior CMU in accordance with manufacturer's recommendations.
- D. Grout for Unit Masonry: Comply with Article 2.2 of TMS 602/ACI 530/ASCE 6.
1. Use coarse grout complying with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 and as indicated in the drawings.
  2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.
  3. Grout shall achieve the following minimum compressive strength value at 28 days:
    - a. As indicated in the drawings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  2. Verify that foundations are within tolerances specified.
  3. Verify that reinforcing dowels are properly placed.
  4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### 3.3 TOLERANCES

#### A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

#### B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

#### C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

### 3.4 LAYING MASONRY WALLS

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

- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 8-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 8 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 8-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
  - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.



- C. Set concrete trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  - 2. Wet joint surfaces thoroughly before applying mortar.
  - 3. Rake out mortar joints for pointing with sealant.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- F. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

### 3.6 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as indicated on Drawings:

### 3.7 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

### 3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

### 3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level C in TMS 402/ACI 530/ASCE 5.
  1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

### 3.10 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

### 3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

### 3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

**END OF SECTION**

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Heat-cured spray and powder coated fluoropolymer coating systems on metal substrates.
- B . Anodized aluminum coatings on metal substrates.

### 1.2 RELATED REQUIREMENTS

- A . 05 50 00 - Metal Fabrications: for components receiving finishes specified in this section.
- B . 07 42 13 - Metal Wall Panels: for components receiving finishes specified in this section.
- C . 07 62 00 - Sheet Metal Flashing and Trim: for components receiving finishes specified in this section.
- D . 08 91 00 - Louvers: for components receiving finishes specified in this section.
- E . Division 23 for mechanical louvers.

### 1.3 SUBMITTALS

- A . Product Data: For each type of coating product specified.
- B . Samples for Verification: For each color and substrate.
- C . Certificate for Applicator's Qualifications: Submit certification from the manufacturer stating that the applicator is an approved applicator of the material for work of this Section.
- D . Samples: Submit samples of each specified finish for verification.
- E . Coating Touch-Up Procedures: Submit coating manufacturer's recommended touch-up procedures and instructions.
- F . Certificate: Submit certification from the coating manufacturer stating that the resin used is fluorosurfactant free.
- G . Warranty Draft: Submit draft of warranty with required inclusions for review. Submit draft warranty with product data.
- H . Contract Closeout Submittal: Submit warranty at time of Project Closeout.

### 1.4 QUALITY ASSURANCE

- A . Applicator Qualifications: Coating manufacturer's approved applicator equipped and trained for application of coatings, and approved to provide warranty specified.

## 1.5 DELIVERY, STORAGE & HANDLING

- A . Deliver, unload, and store coated items so that they remain free of damage and deformation. Package and protect items during shipping and handling. Protect stored items from water. Keep coated items out of contact with materials that may adversely affect the coating.

## 1.6 COORDINATION

- A . Coordinate substrates and shop-applied coating systems. Where items are indicated to match coatings selected for other items, adjust formulations as required to achieve match.

## 1.7 WARRANTY

- A . Fluoropolymer Coatings: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which coatings do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
  - 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. Warranty Period: 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Heat-cured fluoropolymer coating systems on metal substrates including curtain walls, metal panels, louvers, and flashing and trim.

### 2.2 FLUOROPOLYMER COATINGS

- A . Basis of Design: The design is based on products manufactured by PPG Industries, Inc. Subject to compliance with requirements, manufacturers offering comparable products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Akzo Coatings, Inc.
  - 2. Valspar Corp.
- B . Fluoropolymer Coatings: Factory applied, multicoat, thermo-cured Polyvinylidene Fluoride (PVDF) coating, composed of a primer specially formulated for aluminum and fluorocarbon topcoats as follows:
  - 1. PVDF Fluorosurfactant Free Resin Content: 70 percent unless indicated otherwise.
- C . Fluoropolymer Aluminum Extrusion Coatings, AAMA 2605: Minimum 70 percent PVDF resin, by weight, in color coat .
  - 1. Product: PPG Industries, Inc., Duranar.
  - 2. Pencil Hardness, ASTM D3363: F, minimum.
  - 3. Dry Film Thickness, ASTM D7091: 0.20 mil primer coat plus 1.0 mil color coat and 0.4 mil clear topcoat, 1.6 mil total, minimum thickness.

4. Locations: Exposed aluminum extrusions, unless indicated otherwise.
- D. Fluoropolymer Aluminum Sheet Coil Coatings, AAMA 2605: 70 percent PVDF resin, by weight, in color coat.
1. Product: PPG Industries, Inc., Duranar.
  2. Pencil Hardness, ASTM D3363: F minimum.
  3. Salt Spray Resistance, ASTM B117: 1,000 hours minimum.
  4. Humidity Resistance, ASTM D2247: 1,000 hours minimum.
  5. Dry Film Thickness, ASTM D7091: 0.15 mil primer coat plus 0.70 mil color coat, 0.85 mil total, minimum thickness.
  6. Dry Film Thickness, ASTM D7091: 0.15 mil primer coat plus 0.70 mil color coat and 0.45 mil clear topcoat, 1.25 mil total, minimum thickness.
  7. Dry Film Thickness, ASTM D7091: 0.80 mil primer coat plus 0.80 mil color coat, 1.60 mil total, minimum thickness.
  8. Dry Film Thickness, ASTM D7091: 0.80 mil primer coat plus 0.80 mil color coat and 0.80 clear topcoat, 2.40 mil total, minimum thickness.
- E. Fluoropolymer Steel Sheet Coil Coatings, AAMA 621: Minimum 70 percent PVDF resin, by weight, in color coat.
1. Product: PPG Industries, Inc., Duranar.
  2. Pencil Hardness, ASTM D3363: F minimum.
  3. Salt Spray Resistance, ASTM B117: 1,000 hours minimum.
  4. Humidity Resistance, ASTM D2247: 1,000 hours minimum.
  5. Dry Film Thickness, ASTM D7091: 0.15 mil primer coat plus 0.70 mil color coat, 0.85 mil total, minimum thickness.
  6. Dry Film Thickness, ASTM D7091: 0.15 mil primer coat plus 0.70 mil color coat and 0.45 mil clear topcoat, 1.25 mil total, minimum thickness.
  7. Dry Film Thickness, ASTM D7091: 0.80 mil primer coat plus 0.80 mil color coat, 1.60 mil total, minimum thickness.
  8. Dry Film Thickness, ASTM D7091: 0.80 mil primer coat plus 0.80 mil color coat and 0.80 clear topcoat, 2.40 mil total, minimum thickness.
- F. Touch-Up Material: Fluoropolymer air-dried system which is recommended and approved by fluoropolymer finish coating manufacturer.

## 2.3 ANODIZED COATINGS

- A. Clear or Color Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.7 mil or thicker.
1. Colors scheduled below.
- B. Clear or Color Anodic Finish: AAMA 611, AA-M12C22A41, Class II, 0.4 mil or thicker.
1. Colors scheduled below.
- C. Alloys: All aluminum should be Aluminum Association alloys as recommended by manufacturers for the use intended and required to produce the specified finish.

1. Aluminum Sheet: ASTM B209, 5005-H14 Aluminum Alloy, 0.050 inch minimum thickness.

D. Anodized Finishing:

1. All exposed surfaces should receive an architectural anodized finish in conformance with Aluminum Association Standard SSA-46 or AAMA 611 standard.
  - a. Processing should be sulfuric acid or equivalent anodizing with electrolytic or immersion deposited inorganic pigmentation in the coating.
2. Exposed Surfaces shall be free of scratches and other serious blemishes.
3. Extrusions shall be given a caustic etch followed by an anodic oxide treatment and then sealed with an organic coating applied with an electrodeposition process.
4. The anodized coating shall comply with all of the requirements of AAMA 612--02: Voluntary Specifications, Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum. Testing shall demonstrate the ability of the finish to resist damage from mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 FLUOROPOLYMER COATINGS PREPARATION

- A. Pretreatment: Mechanically clean and chemically pretreat fabricated items in accordance with coating manufacturer's requirements and AAMA requirements for finish indicated.

3.3 FLUOROPOLYMER COATINGS APPLICATION

- A. Apply primer and finish coats in accordance with coating manufacturer's requirements for finish indicated.
- B. Thermally cure (bake) coating immediately following application.
- C. Process coil coating in one production lot to aid in eliminating color variations due to use of metallic coating.
- D. Surface Appearance: Cured coating must be visibly free from flowlines, streaks, blisters and other surface imperfections on exposed surfaces.
  1. Surfaces shall have no signs of mill finish aluminum or galvanized material showing.
  2. No "rack" or "gripper" marks caused by the finishing process on exposed aluminum surfaces will be permitted.

3.4 FLUOROPOLYMER COATINGS REPAIR AND TOUCH-UP

- A . Repair with coating manufacturer's recommended products or system.

END OF SECTION



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Structural steel.
  - 2. Field-installed shear connectors.
  - 3. Grout.

### 1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 5. Identify members and connections of the seismic-load-resisting system.
  - 6. Identify demand critical welds.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint qualified by testing, including the following:
  - 1. Power source (constant current or constant voltage).
  - 2. Electrode manufacturer and trade name, for demand critical welds.
- D. Sustainable Design Submittals:
  - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
  - 2. Environmental Product Declaration: For each product.

1.5 INFORMATION SUBMITTALS

- A. Qualification Data: For qualified Installer and fabricator.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Product Test Reports: For the following:
  - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 2. Shear stud connectors.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shop primers.
  - 5. Nonshrink grout.
- E. Source quality-control reports.
- F. Field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
  - 1. In lieu of the AISC-Certified Plant option noted above, the fabricator may provide the following documentation to satisfy the requirement:
    - a. Written quality control (QC) and quality assurance (QA) plan outlining their internal fabrication practices to meet the quality of work required and expected by the owner to complete the project successfully. The QA/QC plan shall address the following as minimum:
      - 1) Management Responsibility and Organization
      - 2) Contract and Project Specification Review and Communication
      - 3) Detailing Procedures
      - 4) Document and Data Control Procedures
      - 5) Fabrication Process Control Procedures
      - 6) Inspection and Testing Procedures
      - 7) Calibration of Inspection, Measuring and Test Equipment
      - 8) Handling, Storage and Delivery of Product and Material Procedures
    - b. List of minimum three (3) relevant projects of similar size, type and complexity.
    - c. Submit items #1 and #2 above with the bid submission as back up to the owner.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
  - 2. AISC 360.

3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Preinstallation Conference: Conduct conference at Project site.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry or rusty before use.

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

#### 1.8 COORDINATION

A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

### PART 2 - PRODUCTS

#### 2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: See Structural Drawings

B. Channels, Angles, and Tees: See Structural Drawings

C. Plate and Bar: See Structural Drawings

D. Cold-Formed Hollow Structural Sections: See Structural Drawings

E. Steel Pipe: See Structural Drawings

F. Welding Electrodes: Comply with AWS requirements, indicated on Drawings.

#### 2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers:

1. Grade: See Structural Drawings, Type 1, heavy-hex steel structural bolts

2. Nuts: ASTM A 563, Grade C, heavy-hex carbon-steel

3. Washers: ASTM F 436, Type 1, hardened carbon-steel
  4. Finish: Plain
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded Anchor Rods: See Structural Drawings, weldable.
1. Configuration: Straight.
  2. Nuts: ASTM A 56 heavy-hex carbon steel.
  3. Plate Washers: ASTM A 36 carbon steel.
  4. Washers: ASTM F 436, Type 1, hardened carbon steel.
  5. Finish: Plain.
- D. Threaded Rods: ASTM A 36.
1. Nuts: ASTM A 563 heavy-hex carbon steel.
  2. Washers: ASTM F 436, Type 1, hardened carbon steel.
  3. Finish: Plain Hot-dip zinc coating, ASTM A 153, Class C.
- E. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- F. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

## 2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- B. Galvanizing Repair Paint: ASTM A780
- C. Color: As selected by architect from manufacturer's full range.

## 2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  1. Camber structural-steel members where indicated.
  2. Fabricate beams with rolling camber up.
  3. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected.
  4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  2. Baseplate Holes: Cut, drill, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  5. Galvanized surfaces.

- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, primer complying with SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer to provide a dry film thickness of not less than 1.5 mils.

## 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.
  - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
- B. Galvanize lintels, shelf angles, and other steel exposed to weather unless specified as painted.

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates and Bearing Plates: Clean concrete- and masonry-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. Weld plate washers to top of baseplate.
  3. Snug-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.
  4. 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.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. 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 is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: See structural drawings

B. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

### 3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - a. Liquid Penetrant Inspection: ASTM E 165.
  - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - c. Ultrasonic Inspection: ASTM E 164.
  - d. Radiographic Inspection: ASTM E 94.



- D. In addition to visual inspection, field-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

**END OF SECTION**

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Delegated design of metal fabrications.
- B . Metal Fabrications.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: Factory applied coatings.
- B . 09 90 00 - Painting and Coating: Field applied paint finish.

### 1.3 SUBMITTALS

- A . Qualification Data: For fabricator and design engineer.
- B . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C . Product Data: On all cleaning, galvanizing, and finishing products, including VOC content.
- D . Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- E . Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- F . Maintenance Data: For users operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.4 QUALITY ASSURANCE

- A . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- B . Fabricators Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172). Company specializing in performing the work of this section with minimum 5 years' experience on projects of similar size and complexity.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A. Items designed and shop fabricated out of steel and aluminum sections, tubing, plates and pipe for exposed and concealed locations.

2.2 MATERIALS

A. Steel:

1. Steel Sections:
  - a. ASTM A36/A36M.
2. Steel Tubing:
  - a. ASTM A500/A500M, Grade B cold-formed structural tubing.
3. Plates:
  - a. ASTM A283/A283M.
4. Pipe:
  - a. ASTM A53/A53M, Grade B Schedule 40, black finish.
5. Slotted Channel Framing:
  - a. ASTM A653/A653M, Grade 33.
6. Slotted Channel Fittings:
  - a. ASTM A1011/A1011M.
7. Fasteners:
  - a. To suit application. Unless noted otherwise, match fasteners exposed to view with the material and color/finish of the material being fastened if metal; color and finish if not metal. Fasteners not exposed to view: Galvanized steel unless otherwise noted.
8. Bolts, Nuts, and Washers:
  - a. ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
9. Welding Materials:
  - a. AWS D1.1/D1.1M; type required for materials being welded.
10. Touch-Up Primer for Galvanized Surfaces: See Section 09 90 00.

B. Stainless Steel:

1. Stainless-Steel Sheet, Strip, and Plate:
  - a. ASTM A240/A240M or ASTM A666, Type 304.

2. Tubing:
    - a. ASTM A554, Grade MT 304.
  3. Pipe:
    - a. ASTM A312/A312M, Grade TP 304.
  4. Castings:
    - a. ASTM A743/A743M, Grade CF 8 or CF 20.
  5. Stainless-Steel Bars and Shapes:
    - a. ASTM A276/A276M, Type 304.
  6. Rolled-Stainless-Steel Floor Plate:
    - a. ASTM A 793.
  7. Stainless-Steel Bolts and Nuts:
    - a. Regular hexagon-head annealed stainless-steel bolts, ASTM F593; with hex nuts, ASTM F594.
- C. Aluminum:
1. Extruded Aluminum:
    - a. ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
  2. Sheet Aluminum:
    - a. ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
  3. Aluminum-Alloy Drawn Seamless Tubes:
    - a. ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.
  4. Aluminum-Alloy Bars:
    - a. ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.
  5. Aluminum-Alloy Sand Castings:
    - a. ASTM B26/B26M.
  6. Aluminum-Alloy Die Castings:
    - a. ASTM B85/B85M.
  7. Bolts, Nuts, and Washers:
    - a. Stainless steel.
  8. Welding Materials:
    - a. AWS D1.2/D1.2M; type required for materials being welded.

## 2.3 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. Continuously 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 small uniform radius.

- E . Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F . Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## 2.4 FABRICATED MATERIALS

- A . Work Bench:
  - 1. Custom built-in.
- B . (

## 2.5 FABRICATION TOLERANCES

- A . Squareness: 1/8 inch maximum difference in diagonal measurements.
- B . Maximum Offset Between Faces: 1/16 inch.
- C . Maximum Misalignment of Adjacent Members: 1/16 inch.
- D . Maximum Bow: 1/8 inch in 48 inches.
- E . Maximum Deviation From Plane: 1/16 inch in 48 inches.

## 2.6 FINISHES

- A . Steel:
  - 1. Prime paint all steel items.
    - a. Exceptions:
      - 1) Galvanize items to be embedded in concrete or masonry.
      - 2) Galvanize items specified for galvanized finish.
      - 3) Do not prime surfaces indicated for spray fire proofing, weathering steel or blackened steel finish.
      - 4) Field welding is required.
    - b. See Section 09 90 00 - Painting and Coating for field finish painting.
  - 2. Prime Painting: One coat.
  - 3. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M or ASTM A153/A153M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
  - 4. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating
- B . Stainless Steel:
  - 1. #4 Satin.

C. Aluminum:

1. Typical Exterior Aluminum Surfaces: Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41  
Clear anodic coating not less than 0.7 mils thick.
2. Typical Interior Aluminum Surfaces: Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31  
Clear anodic coating not less than 0.4 mils thick.
3. On systems indicated: High Performance Organic Coating System: In accordance with Section 05 05  
13 - Shop-Applied Coatings for Metal.
4. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or  
dissimilar materials.

2.7 ACCESSORIES

- A. All accessory materials required by the fabricator for a complete installation of the installed products in a  
manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion  
of erection and installation of permanent attachments.
- C. Field weld components indicated.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be  
in contact with concrete.

3.3 INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.4 PROTECTION

- A. Protect installed work as required by the fabricator to maintain finishes, product performance, design  
criteria, and warranty.

3.5 SCHEDULE

- A. Bollards: Steel pipe, concrete filled, crowned cap; shop primed, field finished.

- B . Ledge Angles, Shelf Angles, Channels, Backing Plates and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
- C . Anchor bolts, steel pipe, cast in masonry anchors, pipe protection.
- D . Door Frames for Overhead Door Openings and Wall Openings: Steel channel and angles; shop primed.
- E . Metal Shelving: Medical storage room.
- F . Metal Wall Base: App Bay.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Rooftop equipment bases and support curbs.
4. Wood blocking, and nailers.
5. Plywood backing panels.

- B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.



- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal size or greater in least dimension.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preservative-treated wood.
  - 2. Engineered wood products.
  - 3. Shear panels.
  - 4. Power-driven fasteners.
  - 5. Post-installed anchors.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
  - 3. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Stud grade.
  - 1. Application: Interior partitions not indicated as load bearing.
  - 2. Species: As indicated in on structural drawings

- B. Framing Other Than Non-Load-Bearing Partitions: As indicated in the structural drawings.
  - 1. Application: Framing other than interior partitions not indicated as load bearing.
  - 2. Species: As indicated in the structural drawings.

## 2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: As indicated in the structural drawings.
  - 1. Manufacturers: Provide products manufactured by Boise Cascade Corporation.
    - a. Extreme Fiber Stress in Bending, Edgewise: As indicated in the structural drawings.
  - 2. Modulus of Elasticity, Edgewise: As indicated in the structural drawings.
- B. Rim Boards: Product designed to be used as a load-bearing member and to brace wood trusses at bearing ends, complying with research or evaluation report for trusses.
  - 1. Manufacturer: Provide products by same manufacturer as Laminated-Veneer Lumber.
  - 2. Material: All-veneer product.
  - 3. Thickness: As indicated in structural drawings.

## 2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
  - 7. Utility shelving.
- B. Dimension Lumber Items: As indicated in the structural drawings.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
  - 1. Northern species; No. 2 Common grade; NLGA.

2. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

## 2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

## 2.8 METAL FRAMING ANCHORS

- A. Manufacturers: Provide products from one of the following:
  - 1. Cleveland Steel Specialty Co.
  - 2. KC Metals Products, Inc.
  - 3. Phoenix Metal Products, Inc.
  - 4. Simpson Strong-Tie Co., Inc
  - 5. USP Structural Connectors.

- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preserved-treated lumber and where indicated.

## 2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Provide one of the following:
  - 1. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
  - 2. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. ICC-ES evaluation report for fastener.

### 3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Roof sheathing.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preserved-treated plywood.

## PART 2 - PRODUCTS



## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

## 2.2 WALL SHEATHING

- A. Plywood Sheathing: as indicated in structural drawings.
  - 1. Span Rating: As indicate in structural drawings.
  - 2. Nominal Thickness: as indicated in drawings.

## 2.3 ROOF SHEATHING

- A. Plywood Sheathing: as indicated in drawings.
  - 1. Span Rating: As indicated in drawings.
  - 2. Nominal Thickness: as indicated in drawings.

## 2.4 PARAPET SHEATHING

- A. Plywood Sheathing: as indicated in drawings.
  - 1. Span Rating: as indicated in drawings.
  - 2. Nominal Thickness: as indicated in drawings.

## 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof, parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

## 2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
  - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

- B. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. ICC-ES evaluation report for fastener.
- D. Coordinate roof, parapet and wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

#### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing: as indicated in drawings.

### 3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to wood framing with [nails] [or] [screws].
  - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 3. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 4. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
  
- B. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
  - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

### 3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

### 3.5 FOAM-PLASTIC SHEATHING INSTALLATION

- A. Comply with manufacturer's written instructions.
  
- B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
  
- C. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Wood roof trusses.
  - 2. Wood girder trusses.
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry"
  - 2. Section 061600 "Sheathing"

### 1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

### 1.4 ACTION SUBMITTALS

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

- B. Shop Drawings: Show fabrication and installation details for trusses.
  - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  - 2. Indicate sizes, stress grades, and species of lumber.
  - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  - 6. Show splice details and bearing details.
  
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer and fabricator.
  
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
  
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.

- D. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preservative-treated lumber.
  - 2. Metal-plate connectors.
  - 3. Metal truss accessories.

#### 1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
  - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
  - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
  - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
  - 1. Design Loads: As indicated in structural drawings.
  - 2. Maximum Deflection under Design Loads: As indicated in structural drawings.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

### 2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Provide dressed lumber, S4S.



4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

### 2.3 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed trusses indicated to receive a stained or natural finish omit marking and provide certificates of treatment compliance issued by inspection agency.

### 2.4 METAL CONNECTOR PLATES

A. General: Fabricate connector plates to comply with TPI 1.

B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

## 2.5 FASTENERS

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

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

B. Nails, Brads, and Staples: ASTM F 1667.

## 2.6 METAL FRAMING ANCHORS AND ACCESSORIES

A. Allowable design loads, as published by manufacturer, shall comply with or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

- D. Truss Tie-Downs: As indicated in structural drawings.

## 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

## 2.8 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

## 2.9 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
  - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
  - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
  - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
  - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not comply with requirements.
  - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

### 3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces according to ASTM A 780/A 780M and manufacturer's written instructions.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

**END OF SECTION**

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Cabinetry.
- B . Cabinet Hardware.

### 1.2 RELATED REQUIREMENTS

- A . 06 10 00 - Rough Carpentry: For hidden shelf supports.
- B . 06 20 00 - Finish Carpentry: For additional wood-based products.
- C . 12 36 00 - Countertops: for countertops installed with casework.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For fabricator and installer.
- B . Product Data: Provide data for hardware, accessories, and finishes.
- C . Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS) Architectural Woodwork Standards.
- D . Sample: Submit sample of cabinet panel construction, minimum 12 inches square, illustrating proposed cabinet substrate and finish.
- E . Hardware Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F . Certificate: Submit certification of required wood products, produced from wood complying with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship.
- G . Manufacturer's Installation Instructions: For finishes and hardware. Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H . Maintenance Data: For users operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.

2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

#### 1.5 MAINTENANCE MATERIAL

- A. Furnish extra materials described below, before installation begins, that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

#### 1.6 QUALITY ASSURANCE

- A. Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- B. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. As required by the quality standard and fabricator for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A. Custom designed and fabricated casework plastic laminate over MDF core and associated accessories and hardware.

#### 2.2 MATERIALS

- A. Cores:
  1. Premium Veneer Core Plywood: Birch Core; Void-Free; made with binder containing no urea-formaldehyde resin.
  2. Hardwood Plywood: HPVA HP-1; made with binder containing no urea-formaldehyde.
  3. MDF: ANSI A208.2, Grade 130; made with binder containing no urea-formaldehyde resin.
- B. Countertop Edge Materials:
  1. Lumber: Maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
  2. Hardwood Edgebanding: Use matching species, color, grain, and grade for exposed portions of wood veneer cabinetry.
- C. Plastic Laminate Materials:
  1. Specification is based on products listed below.
  2. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

- a. Horizontal Surfaces: HGS, 0.048 inch nominal thickness.
- b. Vertical Surfaces: VGS, 0.028 inch nominal thickness.
- c. Flame Retardant Surfaces: HGF, 0.048 inch nominal thickness.
- d. Cabinet Liner: CLS, 0.020 inch nominal thickness.
- e. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

D . Products:

1. (PL-1)
  - a. Basis of Design: Wilsonart.
  - b. Color: Sap Walnut 8221-38.
  - c. Grain to run vertically, all locations.
2. (PL-2)
  - a. Basis of Design: LaminArt.
  - b. Color: #2448-T Charcoal Gray.
  - c. Wall Protection locations to receive hardboard, or similar, substrate,
  - d. Top and Divider Trims (at wall protection locations): Satin Anodized Aluminum J-Trim

## 2.3 CABINET HARDWARE

A . Drawer Slides:

1. Performance Criteria:
  - a. Rated medium duty grade for drawer size indicated.
    - 1) Drawer slides rated for 100 lbs. minimum.
  - b. Rated extra heavy duty grade for drawer size indicated.
    - 1) Drawer slides rated for 250 lbs. minimum.
  - c. Trash, recycle, and compost drawer slides rated for 500 lbs. minimum.
2. Features:
  - a. Full extension.
  - b. Soft-close, stay-closed feature.

B . Door and Drawer pulls:

1. Performance Criteria:
  - a. ADA Standards Compliant.
2. 2-1/2-inch Center to Center:
  - a. Model No.: 5007-64-MB.
  - b. Finish: Black matte.
  - c. Location: Typical pulls for cabinetry.



3. 5-inches Center to Center:
    - a. Model No.: 5002-128-MB
    - b. Finish: Black matte.
    - c. Location: Wardrobe casework and tall kitchen cabinets.
  - C. Hinges: European-style, concealed, opening to 135 degrees; soft-closing.
  - D. Counter Support Brackets:
    1. Performance Criteria:
      - a. Capacity: 450 lbs./bracket.
    2. Features:
      - a. Hidden support bracket.
      - b. Style and Length: As required by condition.
      - c. Inside wall configuration.
- 2.4 ACCESSORIES
- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with Quality Standards.

#### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Assemble cabinets and complete fabrication.
- C. Anchor cabinets to structure. Secure with countersunk, concealed fasteners
  1. For shop finished items, use color matched wood filler.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  1. Scribe and cut cabinets to fit adjoining work and repair damaged finish at cuts.
  2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned.
  3. Maintain veneer sequence matching of cabinets with transparent finish.

E . Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

#### 3.4 ADJUSTING

A . Adjust and lubricate hardware for proper operation. Adjust hardware to center doors and drawers in openings and to provide smooth operation. Complete installation of hardware and accessory items as indicated.

#### 3.5 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Cold Applied, Cut Back Asphalt Dampproofing.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer, fabricator, and installer.
- B . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.
- D . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommended schedule of maintenance.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- C . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Dampproofing on concrete foundation or site walls.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Bitumen: Asphaltic emulsion, ASTM D3747.
- B . Asphalt primer: ASTM D41/D41M, compatible with substrate.
- C . Sealing mastic: Asphalt roof cement, ASTM D2822/D2822M, Type I.
- D . Protection board, drainage fabric, and board.

### 2.3 COLD APPLIED, CUT BACK ASPHALT DAMPPROOFING

- A . Asphalt and solvent compound mixed to a smooth, uniform consistency to provide a firm, moisture-resistant, vapor-resistant, elastic coating recommended by the manufacturer for dampproofing use when applied according to the manufacturer's instructions.
  - 1. Trowel Grade: Asphalt roof cement, consisting of an asphalt base with petroleum solvents and mineral stabilizers, complying with referenced ASTM D4586/D4586M, Type I.
  - 2. Semi-mastic Grade: Asphalt roof coating, consisting of an asphalt base with petroleum solvents and mineral stabilizers, complying with ASTM D4479/D4479M, Type I.
- B . Products:
  - 1. Basis of Cost: W.R. Meadows, Inc. Products: Sealmatic Trowel-Mastic or Sealmatic Semi- Mastic.
  - 2. Basis of Cost: BASF: MasterSeal 615.
  - 3. Basis of Cost: Karnak Products: 86AF Fibered Trowel Mastic or 83AF Fibered Dampproofing.

### 2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Manufacturer's accessories required by the project:
  - 1. Protection Course:
    - a. Multi-ply, semi-rigid core composed of a mineral-fortified asphalt core formed between two outside layers of asphalt-impregnated reinforced mats, manufactured in accordance with ASTM D6506.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.
- B . Notify Manufacturer's representative and Architect at least 45 hours before application.
  - 1. Apply no material until Manufacturer's representative has approved proposed application and equipment.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Protect adjacent surfaces, including concrete to be exposed to view in finished building, from drips, splatter, or running of material.
- C . Apply in two heavy coats to completely cover surfaces:
  - 1. Extend 6-inches below transition to adjacent coatings.
  - 2. Do not apply to concrete surfaces that will be exposed to view in the finished building.
- D . Apply to 1/8 inch minimum thickness (total including both coatings).
- E . Curing: Allow dampproofing material to cure and set Manufacturer's recommended length of time prior to installation of protection board, and backfilling. Prevent injury to bituminous dampproofing.
- F . Protect dampproofing from damage by adhering protection course with tight joints over dampproofing surface. Scribe and cut boards around projections and interruptions.

### 3.4 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A. Water Repellent/Anti-Graffiti Coating for Masonry.
- B. Water Repellent/Anti-Graffiti Coating for Porous Masonry.

### 1.2 RELATED REQUIREMENTS

- A. 07 90 05 - Joint Sealers.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A. Qualification Data: For manufacturer and installer.
- B. Product Data: Provide product description, details of tests performed, limitations, and chemical composition.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to Architect the same day as inspection occurs; mail report on manufacturer's letterhead to Architect within 2 days after inspection.
- F. Field testing: Test surfaces with RILEM tube at:
  - 1. Center of masonry unit.
  - 2. Mortar joint between units.
  - 3. Concrete walls.
- G. Installer's Qualifications: Submit documentation that proposed installer meets specified requirements.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project. Confirm compatibility with cleaning materials and adjacent sealants.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Water Repellent Material: Two gallons of the type installed.

3. Extra Anti-Graffiti Material: Two gallons (9 liters) of the type installed.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.
- C. Owner reserves the right to provide continuous independent inspection of surface preparation and application of water repellent.
- D. Provide compatible water repellent and anti-graffiti coatings by same manufacturer.

#### 1.6 MOCKUP

- A. Prepare a representative surface 36 by 36 inch in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mockup constitutes standard for workmanship.
- B. For proposed substitutions, prepare side-by-side mockups of specified and substitute products.
- C. Locate where directed.
- D. Test using RILEM tube test method described in Field Quality Control.
- E. Approved mockup may remain as part of the Work.

#### 1.7 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.
- C. Do not apply water repellents when wind velocity is higher than 5 mph.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.

#### 2.2 ANTI GRAFFITI COATING

- A. Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
  1. Basis of Cost: Sure Klean® Weather Seal Blok-Guard® & Graffiti Control. Clear, solvent-based silicone elastomer with 9 percent active substance and the following characteristics:
    - a. Applications: Vertical surfaces and non-traffic horizontal surfaces.

- b. Number of Coats: As recommended by manufacturer for substrate materials.
  - c. VOC Content: Greater than 600 g/L. Manufactured and marketed in compliance with USEPA AIM VOC regulations (40 CFR 59.403).
  - d. Specific Gravity: 0.802.
  - e. Weight/Gallon: 6.67 pounds.
  - f. Flash Point: 100 degrees F (38 degrees C) ASTM D 3278.
- B. Water Repellent & Anti-Graffiti Coating for Porous Masonry: Clear-drying, water-based silicone emulsion for weatherproofing concrete block and other porous masonry materials including interior and exterior masonry surfaces.
- 1. Basis of Cost: Prosoco Sure Klean® Weather Seal Blok-Guard® & Graffiti Control II.
    - a. VOC Content: Less than 20 g/L, Low Solids Coating. Complies with all known federal, state and district AIM VOC Standards.
    - b. Specific Gravity: 1.00
    - c. Weight/Gallon: 8.32 pounds
    - d. Graffiti Removal Product: Prosoco Defacer Eraser® Graffiti Wipe.
- C. Water Repellent for Porous Masonry: Clear amber liquid vinegar-like order, solvent-free blend of silanes and oligomeric alkoxy siloxanes concentrate mixed with fresh water for weatherproofing dense or porous masonry surfaces.
- 1. Basis of Cost: Prosoco Sure Klean® Weather Seal Siloxane WB Concentrate.
    - a. VOC Content: Less than 20 g/L, Low Solids Coating. Complies with all known federal, state and district AIM VOC Standards.
    - b. Specific Gravity: 0.96.
    - c. Weight/Gallon: 7.9 pounds.
    - d. Application: Diluted per manufacturer's recommendation.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

#### 3.2 PREPARATION

- A. Protection of Adjacent Work:
  - 1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
  - 2. Protect adjacent surfaces not intended to receive water repellent such as weep holes at through wall flashing locations and sealant joint locations.
- B. Prepare surfaces to be coated as recommended by water repellent and anti-graffiti coating manufacturer for best results.



- C. Do not start work until masonry mortar and concrete substrate is cured a minimum of 60 days.
- D. Remove loose particles and foreign matter.
- E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
- F. Scrub and rinse surfaces with water and let dry.
- G. Acid etch smooth concrete surfaces to be coated, using procedures described in Master Painters Institute Consultantal Painting Specifications Manual; match approved mockup.
- H. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

### 3.3 APPLICATION

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
- B. Apply anti-graffiti coating on all masonry surfaces within 20 feet of grade and other horizontal public occupied surfaces.
- C. Apply at rate recommended by manufacturer, continuously over entire surface.
- D. Apply two coats, minimum.
- E. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.
- F. Provide manufacturer's field service representative to inspect preparation and application work for at least 3 hours on first day to ensure that manufacturer's "best practices" for preparation and application are being followed.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's representative's attendance for mockup and preinstallation conference is required.
- B. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.
- C. Field testing:
  - 1. Equipment: Vertical and Horizontal RILIM tubes, and putty are available at <http://www.prginc.com/>.

2. Procedure: The testing apparatus is affixed by interposing a tape of putty between the flat, circular brim of the pipe and the surface of the masonry material. To ensure adhesion, manual pressure is exerted on the cylinder. Water is then added through the upper, open end of the pipe until the column reaches the 0 gradation mark. The quantity of water absorbed by the material during a specified period of time is read directly from the graduated tube. The periods of time appropriate for the test depend on the porosity of the material on which the measurement is being made; generally 5, 10, 15, 20, 30 and 60 minute intervals provide the most useful data. Measure water absorption through the mortar joint as well as through the surface of the substrate.
3. Report: Results of the test measurements are presented in the form of a water absorption graph with the volume of water absorbed in cubic centimeters reported as a function of time in minutes. The masonry surface tested must be mentioned in the report.
4. Perform 3 tests on each surface coated and 3 at mortar joints in each type of masonry unit.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Foam Board Insulation.
- B . Fiber Board Insulation.
- C . Foam Detailing Insulation.

### 1.2 RELATED REQUIREMENTS

- A . 07 21 19 – Foamed-In-Place Insulation: For closed cell polyurethane foam.
- B . 09 21 16 - Gypsum Board Assemblies: For acoustic insulation installed as a component of assemblies.

### 1.3 SUBMITTALS

- A . Qualification Data: For installer, manufacturer, and design engineer.
- B . Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C . Test Report: Submit report of full-size mockup test for NFPA 285 fire performance, with project cladding assemblies highlighted, for foam insulation on exterior.
- D . Shop Drawings: Indicate required flashings, control joints, and expansion joints, and sealing details at openings, projections, penetrations, and sleeves to maintain continuous thermal barrier.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
  - 1. Include recommended fastening components and spacing to control sag.
  - 2. Include manufacturer's recommended product for thermal barrier over foam insulation exposed to interior in accordance with IBC 2012.2603.4.
    - a. ". . .tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275."

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualification:
- B . Designer Qualifications:
- C . Installer Qualifications: Company specializing in performing the work of this section with minimum 2 years experience.

## 1.5 MOCKUP

- A . Construct mockup of 100 sq ft of horizontal insulation exposed in unconditioned space, representing finished work including internal and external corners.
1. Locate where convenient.
  2. Mockup may remain as part of the Work.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Foam board, fiber board, and batt insulation.

### 2.2 MATERIALS

- A . Foam Board Insulation:

1. Expanded Polystyrene Board Insulation: ASTM C578.
  - a. Basis of Design: EPS by INSULFOAM. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
  - b. Performance Criteria:
    - 1) Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
    - 2) Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    - 3) Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
    - 4) Water Absorption: 4 percent by volume, maximum, when tested in accordance with ASTM D2842.
    - 5) Board Density: 0.7 lb/cu ft.
    - 6) Compressive Resistance: 25 psi.
  - c. Features:
    - 1) Board Size: 48 x 96 inch.
    - 2) Board Thickness: 1-1/2 inches.
    - 3) Board Edges: Square.
  - d. Locations:
    - 1) Under slabs in pedestrian use areas only.
    - 2) Over waterproofing in horizontal applications, at planters and upper decks with pavers.
2. Extruded Polystyrene Board Insulation: ASTM C578, Type X.

- a. Basis of Design: Styrofoam by Dow.
  - b. Performance Criteria:
    - 1) Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
    - 2) Water Absorption: 4 percent by volume, maximum, when tested In accordance with ASTM D2842.
    - 3) Water Vapor Transmission: 1.5 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
    - 4) Board Density: 1.3 lb/cu ft.
    - 5) Compressive Resistance: 15 psi.
    - 6) Thermal Conductivity (k factor) at 25 degrees F: 0.28.
    - 7) Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 5.4.
  - c. Features:
    - 1) Board Size: 48 x 96 inch.
    - 2) Board Thickness: As indicated on Drawings.
    - 3) Board Edges: Square.
  - d. Locations: Split slab conditions at vehicular areas.
3. Polyisocyanurate Board Insulation:
- a. Rigid cellular foam, complying with ASTM C1289.
  - b. Basis of Design: ECOMAXci by Rmax.
  - c. Performance Criteria:
    - 1) Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
    - 2) Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    - 3) Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
    - 4) Water Absorption: <1 percent by volume, maximum, when tested In accordance with ASTM C209.
    - 5) Water Vapor Transmission: <0.3 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
    - 6) Board Density: 2 lb/cu ft.
    - 7) Compressive Resistance: 25 psi.
  - d. Features:
    - 1) Thickness: As indicated on Drawings.
  - e. Location: Roofing assemblies.
- B . Fiber Board Insulation:
- 1. Glass Fiber Board Insulation: Rigid glass fiber, ASTM C612.
    - a. Basis of Design: 814 Spin-Glas by Johns Manville.

- b. Performance Criteria:
    - 1) Facing: White kraft paper, fiberglass scrim, aluminum foil laminate (ASJ)
    - 2) Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
    - 3) Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    - 4) Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
    - 5) Water Absorption: <5 percent by weight, maximum, when tested in accordance with ASTM C209.
    - 6) Board Density: 3 lb/cu ft.
    - 7) Compressive Resistance: 25 psi.
  - c. Features:
    - 1) Thickness: As indicated on Drawings.
  - d. Location: Insulation in Metal Framed Walls as indicated.
2. Mineral Fiber Board Insulation:
- a. Rigid mineral fiber, ASTM C612.
  - b. Basis of Design:
    - 1) CavityRock DD by ROCKWOOL.
      - a) EPD: ED 7/26/2020. Stonewool Insulation by ROCKWOOL (including CavityRock). External. Exp: 6/17/2024.
    - 2) Rainbarrier 45 by Thermafiber.
  - c. Performance Criteria:
    - 1) Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
    - 2) Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    - 3) Rated Non-combustible per NFPA standard 220 in accordance with ASTM E136.
    - 4) Water Absorption: 0.03 percent by volume, maximum, when tested in accordance with ASTM C1104.
    - 5) Water Vapor Transmission: 50 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
    - 6) Board Density: 4.5 lb/cu ft.
    - 7) Compressive Resistance: 25 psi.
    - 8) Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 4.2.
  - d. Features:
    - 1) Board Thickness: 2.5 inches.
    - 2) Installation: Glue or friction fit between z-clips; no stick pin through fastening.

- e. Locations: Ceiling of unconditioned or semi conditioned spaces located below conditioned spaces.

C . Fiber Batt Insulation:

1. Mineral Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
  - a. Basis of Design: MinWool Sound Attenuation Fire Batts by Johns Manville.
  - b. Performance Criteria:
    - 1) Combustibility: Non-combustible, when tested in accordance with ASTM E136.
    - 2) Manufactured with binder containing no added urea formaldehyde.
    - 3) Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
    - 4) Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    - 5) Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 3.1.
  - c. Location: Curtain wall spandrel panels.
    - 1) .

D . Sound Batt Insulation:

1. Sound Attenuation Blanket Insulation: Mineral wool batts; mineral fiber (inorganic material; rock and blast furnace slag); ASTM E136 noncombustible; moisture-resistant; ASTM C665 noncorrosive Type I; non-deteriorating; mildew-proof; vermin-proof; available in 1-1/2-inch to 7-inches thickness, widths of 17-inches and 25-inches, lengths of 48-inches; density of 2.5 PCF. Tested to ASTM C518. R-3.7 per inch of thickness. Unfaced Flame Spread = 0. Smoke Development = 0.
2. Product: Thermafiber SAFB (Sound Attenuation Fire Blankets) Insulation or approved equal.

E . Foamed-In-Place Insulation: See Section 07 21 19.

## 2.3 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Sheet Vapor Retarder: Specified in Section 07 25 00 - Weather Barriers.
- C . Protection Membrane: White, Polypropylene fiberglass scrim.
- D . Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Foamed-in-place insulation.
- B . Protective cementitious overcoat.

### 1.2 RELATED REQUIREMENTS

- A . 07 21 00 - Thermal Insulation: Foam board and batt insulation.
- B . 09 21 16 - Gypsum Board Assemblies: For acoustic insulation installed as a component of assemblies.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 30 00 - Administrative Requirements.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer and applicator.
- B . Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C . Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B . Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years of experience and approved by the manufacturer.

### 1.6 REGULATORY REQUIREMENTS

- A . Conform to applicable code for flame and smoke limitations.

### 1.7 FIELD CONDITIONS

- A . Do not install insulation when ambient temperature is lower than 70 degrees F.
- B . Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

- C . Do not apply foam when temperature is within 5 F of dew point.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
1. Basis of Design: Bayseal CC X from Bayer Material Science.

### 2.2 MATERIALS

- A . Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
1. Regulatory Requirements: Conform to applicable code for flame and smoke limitations.
  2. Aged Thermal Resistance (R-value): 6.5 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
  3. Water Vapor Permeance: Vapor retarder; 1 perm, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
  4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
  5. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.5 psf.
  6. Closed Cell Content: At least 90 percent.
  7. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
  8. Products:
    - a. Basis of Design: Bayseal CC X from Bayer Material Science; [www.spf.bayermaterialscience.com](http://www.spf.bayermaterialscience.com).

### 2.3 ACCESSORIES

- A . Primer:
1. As required by insulation manufacturer.
- B . Overcoat:
1. Cementitious type, spray applied; flame spread index of 5 and smoke developed index of 0, when tested in accordance with ASTM E84; provide Z3306 manufactured by GCP Applied Technologies Inc..

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify work within construction spaces or crevices is complete prior to insulation application.

- B . Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

### 3.2 PREPARATION

- A . Mask and protect adjacent surfaces from over spray or dusting.
- B . Apply primer in accordance with manufacturer's instructions.

### 3.3 APPLICATION

- A . Apply insulation in accordance with manufacturer's instructions.
- B . Apply insulation by spray method, to a uniform monolithic density without voids.
- C . Apply to achieve a thermal resistance R value of 13.
- D . Patch damaged areas.
- E . Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F . Trim excess away for applied trim or remove as required for continuous sealant bead.

### 3.4 FIELD QUALITY CONTROL

- A . Inspection will include verification of insulation and overcoat thickness and density.

### 3.5 PROTECTION

- A . Do not permit subsequent construction work to disturb applied insulation.
- B . Protect from direct sunlight as required by manufacturer's instructions

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Self Adhered Weather Barrier Sheet.
- B . Liquid Applied Weather Barrier Coating.
- C . Flexible Flashings.

### 1.2 RELATED REQUIREMENTS

- A . 07 21 00 - Thermal Insulation: Vapor retarder and air barrier components installed in conjunction with insulation.
- B . 07 54 00 - Thermoplastic Membrane Roofing: Vapor retarder and air barrier components installed in conjunction with roofing membrane.
- C . 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

### 1.3 DEFINITIONS

- A . Weather Barrier: Assemblies that form water-resistive barriers, air barriers, or vapor retarders.
- B . Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
- C . Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
- D . Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water without sealed seams.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one month before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of air barrier system materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection of continuous air barrier.

### 1.5 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.

- B . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C . Shop Drawings: Indicate extents, special joint or termination conditions, and conditions of interface with other materials. Indicate line of continuous air barrier at building exterior.
- D . Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of air barrier system installation.
- E . Test Report: Submit report of full-size mockup test for NFPA 285 fire performance.
- F . Field test results.
- G . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, perimeter conditions requiring special attention, and storage and handling criteria.
- H . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

#### 1.6 QUALITY ASSURANCE

- A . Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience with local product representation available to review product installation.
- B . Installer Qualifications: Company specializing in performing the work of this section, using specified materials with minimum 5 years of experience on projects of similar size and complexity.

#### 1.7 MOCKUP

- A . Construct mockup of 100 sq ft of horizontal waterproofing, representing finished work including internal and external corners.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

#### 1.9 WARRANTY

- A . Manufacturer's warranty for air barrier for a period of ten (10) years from date of Purchase.
  - 1. Preinstallation meeting and jobsite observations by air barrier manufacturer may be required for specified warranty.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Components of vapor retarder and air barrier assemblies under opaque cladding; including liquid, sheet, and flexible transition flashings.

## 2.2 PERFORMANCE AND DESIGN CRITERIA

### A . Air Permeability:

1. The system: Air permeability not to exceed 0.04 cfm/ft<sup>2</sup> under a pressure differential listed, when tested per ASTM E2357

### B . Air Infiltration: 0.004 cfm/sq ft maximum per ASTM E283.

### C . Fire Performance: Tested in accordance with, and complying with the acceptance criteria of, NFPA 285; testing must be performed specifically for this project.

### D . Fire Performance: Combustible exterior wall coverings shall be tested in accordance with NFPA 268.

1. 2012 IBC.1406.1.1.

## 2.3 MATERIALS

### A . Liquid Applied Weather Barrier Membrane:

1. Specification is based on Prosoco R-Guard by Prosoco.
  - a. Comparable products by one of the following are also acceptable. See Section 01 60 00 - Product Requirements for submittal requirements.
    - 1) DOWSIL Silicone Air Barrier System.
    - 2) Carlisle Coatings and Waterproofing.
    - 3) Henry Company.
    - 4) GRACE.
    - 5) Tremco.
  - b. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
2. Performance Criteria:
  - a. Air Permeance: Pass: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
  - b. Water Vapor Permeance: 15 perms, minimum, when tested in accordance with ASTM E96/E96M.
3. Features:
  - a. Material Thickness: 12-15 mils as recommended by manufacturer to attain the performance criteria specified over the substrates present.
  - b. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for ultraviolet and weather exposure.
  - c. Color: To be selected by Architect from manufacturer's full range.
4. Full line of accessories:
  - a. Fast flash.
  - b. Porous preparation.
  - c. Joint and seam sealer.
  - d. Cat-5.

B . Self-Adhered Weather Barrier Sheet:

1. Specification is based on product by products listed below:
  - a. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
2. Performance Criteria:
  - a. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
  - b. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M.
3. Products:
  - a. Vaproshield SA Membrane System by VaproShield.
    - 1) Features:
      - a) Material Thickness: 60 mils.
      - b) Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 6 months weather exposure.
  - b. Majvest SA by SIGA.
    - 1) Features:
      - a) Material Thickness: 28 mils.
      - b) Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 6 months weather exposure.

C . Flexible Flashings.

1. Liquid Flashing Membrane: Product recommended by weather barrier manufacture to maintain performance criteria while transitioning to rough openings.
2. High Temperature Self-Adhering Membrane Flashing: Meeting AAMA 711 specification for heat exposure range Level 3 Service temperature over 176 degrees: Butyl based bituminous sheet membrane, 30-40 mil thickness, laminated to a cross-laminated polyethylene film, in factory cut widths. One of the following:
  - a. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Blueskin PE 200HT by Henry Company.
    - 2) CCW-705 HT by Carlisle Coatings & Waterproofing Inc.
    - 3) Lastobond Shield HT by Soprema Inc.
3. Liquid Mastic: Liquid mastic recommended by flashing manufacturer.
4. Primers, Cleaners, Insulation Adhesive, Joint Compound, and Sealant Materials: As recommended by air barrier manufacturer, appropriate to application, and compatible with adjacent materials.

2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

- B . Liquid Flashing Membrane:
  - 1. At locations recommended by air and water resistant membrane manufacturer.
- C . Primer:
  - 1. Liquid waterborne or solvent-borne primer recommended for substrate by air and water barrier material manufacturer.
- D . Counter-flashing and Transition Strips:
  - 1. Modified bituminous or butyl based, 40-mil thick, self-adhering sheet flashing, polyethylene or foil carrier sheet as location and function dictate.
- E . Liquid-Applied Flashing:
  - 1. Manufacturer's recommended gun-grade waterproofing, adhesive, and detailing company that combines the best of silicone and polyurethane properties. The single component, Silyl-Terminated-Poly-Ether (STPE) produces a highly durable, seamless, elastomeric that should treat joints, seams, cracks, and provide the flashing membrane in rough openings of structural walls and to counter-flash waterproofing and air barrier components.
- F . Joint Reinforcing Strip:
  - 1. Manufacturer's joint reinforcing tape.
- G . Substrate-Patching Membrane:
  - 1. Manufacturer's standard trowel-grade substrate filler.
- H . Adhesive and Tape:
  - 1. Manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- I . Metal Flashings:
  - 1. Per 07 62 00 - Sheet Metal Flashing and Trim.
- J . Sprayed Polyurethane Foam Sealant:
  - 1. Per 07 21 00 - Thermal Insulation.
- K . Joint Sealant:
  - 1. Per 07 90 05 - Joint Sealers.
- L . Air Barrier Sealant:
  - 1. Manufacturer's recommended sealant to seal field sheet-applied air barrier membrane to sheet-applied air barrier membrane; seal field sheet-applied air barrier membrane to self-adhered membrane; seal membrane flashing around opening to vinyl windows and doors.
- M . Termination Mastic:
  - 1. Fluid or sheet-applied air and water barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.



### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Follow specific requirements for lapping and integration with flashings described in the details to form an air and weather tight installation.
- C . Where primer is required, prime substrates at a rate required by air and water barrier manufacturer and allow it to dry. Limit priming to areas that will be covered by material on same day. Re-prime areas exposed for more than 24 hours.
  - 1. Where required, prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- D . Connect and seal exterior wall air and water barrier material continuously to the following areas where applicable, using accessory materials as indicated in the Drawings:
  - 1. Roofing-membrane, 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.
- E . Install air and water barrier as recommended by the manufacturer around window and door rough openings and at penetrations after sheathing is installed and penetrations have been secured. Provide minimum overlaps as require.
- F . Coordinate installations with Section 07 62 00 - Sheet Metal Flashing and Trim to provide air tight transitions within the air and weather barrier membrane including but not limited to rough opening and penetration heads, ledger angles, and cross cavity through wall flashings. Install tapes and sealant continuously as required to provide an air tight installation.
- G . Secure and/or adhere the air and weather barrier system as required by manufacturer.
- H . Ensure that air and weather barrier is air tight, free from holes, tears, and punctures.
- I . Cover air and weather barrier system within manufacturer's recommended exposure timeframe.

#### 3.4 CLEANING

- A . Clean dust, dirt, and debris from the surface of air and water resistant barriers prior to installation of furring and/or cladding materials.

### 3.5 PROTECTION

- A . Protect air and water barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
  - 1. Protect air and weather barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for longer than manufacturer's recommended timeframe, remove and replace fluid-applied air and weather barrier or install additional, full-thickness, fluid-applied air and weather barrier application after repairing and preparing the overexposed membrane according to fluid-applied air and weather barrier manufacturer's written instructions.
  - 2. Protect fluid-applied air and weather barrier from contact with incompatible materials and sealants not approved by fluid-applied air and weather barrier manufacturer.
- B . Repair damage before proceeding with subsequent construction.
- C . Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D . Remove masking materials after installation.

### 3.6 SCHEDULE

- A . Self-Adhered Weather Barrier Sheet.
  - 1. Locations: Behind CMU veneer.
- B . Liquid Applied Weather Barrier Coating.
  - 1. Locations: Typical unless noted otherwise.
- C . Mechanically Fastened Vapor Barrier Sheet.
  - 1. Locations: Inside of stud at exterior walls as indicated.
- D . Flexible Flashings:
  - 1. Liquid Flashing Membrane: At locations recommended by weather barrier manufacturer.
  - 2. Self-Adhering Flexible Flashing: Transition flashing at sheathing, metal flashings, locations not suitable for liquid flashing membrane, and other locations indicated..
  - 3. High Temperature Self-Adhering Membrane Flashing: Beneath metal copings, metal roofing, metal plate assemblies, and other locations indicated.
  - 4. Foil-Faced Self-Adhering Membrane Flashing: At framed glazing assembly wall penetrations, wall openings, and other locations as indicated

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Metal wall panels.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: For finish on panels.
- B . 07 21 00 - Thermal Insulation: For insulation and exterior insulation thermal spacers installed with system.
- C . 07 25 00 - Weather Barriers: For weather barrier underlayments installed with system wall panels.
- D . 07 90 05 - Joint Sealers: For joint sealant installed with system.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 DEFINITIONS

- A . Rainscreen: Exterior wall assembly in which cladding stands off from the moisture-resistant surface of an air and water barrier applied to the sheathing to create a capillary break and to allow drainage and evaporation.
- B . Metal Wall Panels: Roll-formed panel; typically less than 1/8 inch thick.
- C . Metal Plate Wall Panels: Panel formed with brake machine; typically 1/8 thick or greater.
- D . Weather-tight: Significantly affecting air and water performance requirements though may not be pressure-equalizing or designed to prevent water intrusion.
- E . DBCV: Drained and back-ventilated cavity rainscreen system designed to drain and dry water entering cavity through drainage channels, weeps, and air ventilation.
- F . PER: Pressure-equalized rainscreen system designed for no water intrusion, with equal pressure within air cavity and outside cladding barrier.

### 1.5 SUBMITTALS

- A . Qualification Data: For manufacturer, installer, fabricator, and design engineer.
- B . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- C. Delegated-Design Submittal: For Pressure-equalized rainscreen system assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Product Data: Include material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.
- E. Shop Drawings: Include layouts of panels, details of edge and penetration conditions, spacing and type of connections, flashings, and special conditions.
  - 1. Show work to be field-fabricated or field-assembled.
  - 2. Indicate joint and reveal sizes and path for water drainage.
- F. Sample: For each panel specified, submit samples of minimum size 12 inches square, representing actual metal panel including material, thickness, profile, color, and texture.
- G. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance. Confirm cleaners are compatible with adjacent materials and face sealers.
- J. Certificate of tested assemblies meeting PER performance requirements.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of panels specified in this section with minimum 5 years of experience.
- B. Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- C. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- D. Installer Qualifications: Company trained and authorized by panel system manufacturer and specializing in performing the work of this section with minimum 3 years of experience.
- E. PER Testing Agency Qualifications:

#### 1.7 MOCKUP

- A. Construct mockup of 100 sq ft of system, representing finished work including internal and external corners.

1.8 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.9 WARRANTY

- A . Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather (10-year weather tight warranty).
1. Panel Finish Criteria are listed AAMA 2605.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Manufactured metal panels for walls and soffits, with insulation, liners, related flashings, and accessory components.

2.2 PERFORMANCE AND DESIGN CRITERIA

A . General:

1. Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.
2. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330/E330M.
  - a. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with code.
  - b. Maximum Allowable Deflection of Panel: 1/180 of span.
3. Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
4. Provide continuity of thermal barrier at building enclosure elements and continuity of air barrier and vapor retarder seal at building enclosure elements in conjunction with materials specified in Section 07 25 00.
5. Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
6. Fabricate and finish panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
7. Factory-install captive gaskets, sealants, or separator strips at panel joints to eliminate metal-to-metal contact, and minimize noise from panel movements.

2.3 MATERIALS

- A . Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality.

B . Panel Finish: In accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.

## 2.4 METAL WALL PANELS

A . Concealed Fastener Metal Wall Panels:

1. (MT-01) Basis of Design: **Berridge FW-1025 or comparable.**
  - a. Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.
2. Features:
  - a. Profile: Non-structural narrow batten.
  - b. Panel Material: Aluminum Sheet.
  - c. Sheet Thickness: 18 gauge with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
  - d. Panel Width: 12-inches.
  - e. Reveal: 2-inch with 2 pencil ribs.
  - f. Finish: To be selected by Architect.
  - g. Attachment: low profile concealed fastener.

## 2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Miscellaneous Metal Subframing and Furring:
1. Material recommended by manufacturer for compatibility with panel base metal and conditions present. Metal Compatibility and furring installed over fiberglass clips and continuous insulation as detailed.
  2. Profile: Manufacturer's standard profile for conditions present.
- C . Miscellaneous Sheet Metal Items:
1. Provide flashings, trim, moldings, closure strips, of the same material, thickness, and finish as used for the panels.
- D . Sealants:
1. As specified in Section 07 90 05.
  2. Exposed sealant must cure to rubber-like consistency.
  3. Concealed sealant must be non-hardening type.
- E . Clips:
1. Interlocking side lap feature which conceals the fasteners and is installed using clips to allow for thermal movement. Clips shall be designed to hold the panel 1/2 inch minimum from exterior insulation to create a drainage plane and ventilation cavity. Load span tables must include evaluation of clip and side joint interaction.
- F . Factory Applied Sealant:
1. Concealed within the interlocking joint.

- G. Internal and External Corners:
  - 1. Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- H. Expansion Joints:
  - 1. Same material, thickness and finish as exterior sheets; 20 gage; manufacturer's standard brake formed type, of profile to suit system.
- I. Trim, Closure Pieces, Caps, Flashings, Facias, and Infills:
  - 1. Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- J. Anchors:
  - 1. Galvanized steel or Stainless steel.
- K. Fasteners:
  - 1. Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- C. Coordinate with installation of associated counterflashings and other components installed under other sections.

#### 3.4 FIELD QUALITY CONTROL

- A. [Required testing for PER?]

#### 3.5 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.6 CLEANING

- A . Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.7 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Vapor retarder.
- B . Insulation.
- C . Cover Board.
- D . PVC roofing membrane.
- E . Roof Edge Securement.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: For finish on roof panels.
- B . 06 10 00 - Rough Carpentry: Wood nailers, curbs and cant strips.
- C . 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings and reglets.
- D . 07 72 00 - Roof Accessories: Roof-mounted units; prefabricated curbs.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.
  - 2. Review UL, FM and Owner requirements for quality assurance and testing.

### 1.4 SUBMITTALS

- A . Qualification Data: For Manufacturer and Installer.
- B . Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C . Shop Drawings: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- D . Sample: Submit manufacturer's standard sample size.
- E . Samples of Aggregate: Submit two one lb containers of aggregate ballast.
- F . Samples of Pavers: Submit two.
- G . Fire Classification Test Report: Showing test reports for classification, assembly, application and roof slopes indicated.

- H. Installer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- I. Manufacturer's Installation Instructions: Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- K. Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience in PVC roof membrane manufacture.
- B. Installer Qualifications: Company specializing in performing the work of this section with a minimum five years of experience and approved by the manufacturer. Applicator shall have installed at least three (3) roofing applications of this type or similar (single-ply membrane) system of equal or greater size within the past three (3) years.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.
- B. Roof-covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels required in accordance with ICC (IBC)-2015 Section 1505. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.
  - 1. ICC (IBC)-2015.1506.1.

## 1.7 WARRANTY

- A. Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion.
- B. Manufacturer Warranty: Provide 20 year manufacturer's Total Roofing System (no dollar limit) Warranty covering all materials incorporated into the roof and labor.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Single ply thermoplastic membrane roofing system including insulations, vapor retarder and all manufacturer's required accessories for watertight, warrantable installation.

## 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Fire Classification: Class B per ASTM E108 or UL 790; for application and roof slopes indicated.
  - 1. ICC (IBC)-2015.1505.1.
- B . Slope: Thermoplastic single-ply membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope).
  - 1. ICC (IBC)-2015.1507.13.1.
- C . Exposure Category: As indicated.
  - 1. ICC (IBC)-2015.1504.8 Maximum mean roof height table.
- D . Nominal Design Wind Speed: As indicated.
  - 1. ICC (IBC)-2015.1504.8 Maximum mean roof height table.
- E . Wind Resistance: Roof coverings installed on roofs in accordance with Section 1507 that are mechanically attached or adhered to the roof deck shall be designed to resist the design wind load pressures for components and cladding in accordance with Section 1609.
  - 1. ICC (IBC)-2015.1504.3.
  - 2. Design Wind Load Pressure: As indicated.
- F . Insulation Thermal Value (R), minimum: As indicated on Drawings; provide insulation of thickness required.
- G . Perform work in accordance with NRCA Roofing and Waterproofing Manual, and manufacturer's instructions.
- H . Detail roofing system as required by membrane manufacturer to attain required warranty and comply with performance criteria indicated.
- I . Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980.
  - 1. Requirement for white roofing only.
  - 2. Field applied coating may not be used to achieve specified SRI.
- J . Thermal Emissivity: 0.80, minimum, initial, and 0.79, minimum, 3-year, certified by Cool Roof Rating Council.
  - 1. Requirement for white roofing only.

## 2.3 MANUFACTURERS

- A . Basis of Design:
  - 1. 80 Mil Sure-Flex KEE HP by Carlisle Roofing Systems, Inc.

## 2.4 MATERIALS

- A . Repair materials: Match existing materials as required to maintain the roofing warranty.
- B . Vapor retarder/Temporary Roof: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.

1. Basis of Design:
    - a. Sure MB 70 SA by Carisle.
  2. Features:
    - a. Approved by manufacturer as part of tested assemblies.
    - b. Approved by manufacturer to be exposed without cover and use as temporary roof.
- C. Insulation: Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with glass reinforced mat laminated to faces – See Section 07 21 00 Thermal Insulation.
- D. Cover Board:
1. Typical: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M:
    - a. Basis of Design:
      - 1) As recommended by membrane manufacturer for installation indicated and in accordance with system performance testing.
    - b. Features:
      - 1) Thickness: 1/2 inch.
  2. At roof hatches and doors opening onto the roof: 4 x 4 foot piece of 1/2 inch APA rated Exterior plywood under cover board in lieu of the top 1/2 inch of insulation.
- E. PVC roofing membrane.
1. Basis of Design: \_\_\_\_\_ 80 Mil PVC by Johns Manville.
  2. Performance Criteria:
    - a. Thermoplastic single-ply roof coverings shall comply with ASTM D4434/D4434M, ASTM D6754/D6754M, ASTM D6878/D6878M, or CGSB CAN/CGSB 37-54.
    - b. Physical Integrity: Passes 2,000 hours of exposure to accelerated weathering tests conducted in accordance with ASTM G152, ASTM G155, or ASTM G154.
    - c. Impact Resistance: Resist impact damage based on the results of tests conducted in accordance with ASTM D3746/D3746M, ASTM D4272/D4272M, CGSB 37-GP-52M, or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.
  3. Features:
    - a. Thickness: 0.080 inch.
    - b. Sheet Width: Factory fabricated into largest sheets possible.
    - c. Reinforcing: Manufacturer's standard.
    - d. Membrane Attachment: Fully adhered.
    - e. Membrane Attachment: Mechanically fastened.
    - f. Membrane Attachment: Loose laid and ballasted.
    - g. Color: White.
- F. Roof Edge Securement: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.

1. Performance Criteria:
  - a. Designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with Test Methods RE-1, RE-2, and RE-3 of ANSI/SPRI ES-1, except Vault wind speed shall be determined from Figure 1609A, 1609B, or 1609C as applicable.
    - 1) ICC (IBC)-2015.1504.5.
  - b. Retain Fascia while allowing for free thermal cycling of fascia.

## 2.5 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Conductive primer for Electronic Leak Detection: For application to cover board or other non-conductive substrate directly beneath membrane approved by primer manufacturer.
  1. Basis of Design: TruGround Conductive Primer by Detec Systems.
  2. TruGround is not intended to replace required adhesives or primers. Required adhesives and primers shall be applied after the TruGround has been applied and is dry. Coordinate with membrane manufacturer to determine if any products should be omitted due to use of TruGround, and to determine coating sequencing.
- C. Wood Nailers:
  1. PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
- D. Walkway Pad:
  1. Manufacturer's recommended product to increase viability and slip-resistance and puncture resistance in walkway areas.
    - a. Layout per Architectural Drawings.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.
- B. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Install electronic leak detection components in accordance with conductive primer manufacturer's written instructions and where indicated.

1. Primer thickness requirements: 1 coat typical; 2 coats for plywood, open-cell insulation, or other porous substrates.

### 3.4 FIELD QUALITY CONTROL

- A . Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes.
- B . Perform all corrections necessary for issuance of warranty.

### 3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Fabricated sheet metal items.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: For finish on sheet metal flashing.
- B . 07 25 00 - Weather Barriers: Moisture protection and underlayments under sheet metal flashings.
- C . 07 90 05 - Joint Sealers: Sealants installed with sheet metal flashing and trim.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For fabricator.
- B . Shop Drawings: Indicate material profile, jointing locations, jointing details, fastening methods, flashings, terminations, and installation details. Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop and field assembled work. Include the following:
  - 1. Identify material, thickness, weight, and finish for each item and location in Project.
  - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
  - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners to adjoining work.
- C . Samples:
  - 1. Finish Sample: Submit two samples illustrating each metal finish color.
  - 2. Fabrication Sample: Submit sample of coping lap joint as it will occur every 10 feet.
- D . Warranty: Submit manufacturer finish warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### 1.5 QUALITY ASSURANCE

- A . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A. Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
  - 1. Panel Finish Criteria are listed AAMA 2605.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A. Sheet metal including steel, stainless steel, and aluminum fabricated into items such as flashings, counterflashings, gutters, downspouts, and other items indicated and scheduled.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. General: Install sheet metal flashing and coping to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg, ambient; material surfaces.

2.3 MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal, shop pre-coated with PVDF coating.
  - 1. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As scheduled below and indicated on drawings.
- B. Pre-Finished Aluminum: ASTM B209; 0.032 inch thick; plain finish shop pre-coated with fluoropolymer coating.
  - 1. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As scheduled below and indicated on drawings.
- C. Stainless Steel: for masonry use: ASTM A666 Type 304, soft temper, 0.018 inch thick; smooth mill finish.
- D. Stainless Steel: For all other uses: ASTM A666 Type 304, rollable temper, 0.018 inch thick; smooth No. 4 finish.



## 2.4 FABRICATION

- A . Conform to referenced SMACNA manual, Manufacturer's recommendations if premanufactured and as detailed. Conform to following general requirements:
- B . Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C . Form pieces in longest possible lengths.
- D . Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- E . Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- F . Hem exposed edges 1/2 inch on unexposed side, miter and seam corners, unless noted otherwise.
- G . Cleats: Fabricate continuous cleats and starter strips from one gauge heavier material than sheet metal material, in widths required by SMACNA, interlockable with sheet.
- H . Fully soldered/welded stainless steel saddle and transition flashings at 3-D transitions such as roof to wall intersections, roof to elevator overrun, and the like.
- I . Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- J . Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection, and as required by SMACNA. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- K . Shingle laps in flashings: 6-inch minimum, sealed with two distinct beads of bib-skinning butyl sealant at each lap.

## 2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Flexible Flashing:
  - 1. For use under metal copings and flashings Section 07 25 00 - Weather Barriers; use high temperature type.
- C . Slip Sheet:
  - 1. Rosin sized building paper.
- D . Protective Backing Paint: See Section 09 90 00 - Painting and Coating.
- E . Sealant: As specified in Section 07 90 05 - Joint Sealers.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

#### 3.4 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

#### 3.5 SCHEDULE

- A . Unless otherwise noted all exposed exterior sheet metal flashing and trim is Pre-Finished Aluminum.
- B . Sheet Metal Panel:
  - 1. Material: Prefinished Aluminum.
  - 2. Thickness: 20 gauge/0.0320 inches.
  - 3. Color: Custom color in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
  - 4. Locations: As indicated.
- C . Counter Flashing:
  - 1. Material: Prefinished Aluminum.
  - 2. Thickness: 20 gauge/0.0320 inches.
  - 3. Color: Custom color in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
  - 4. Seaming: Fully-welded shop fabricated corners and end dams.
- D . Masonry Through Wall flashing:
  - 1. Material: Prefinished Aluminum.
  - 2. Thickness: 20 gauge/0.0320 inches.
  - 3. Color: Custom color in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
  - 4. Seaming: Fully-welded shop fabricated corners and end dams.
- E . Gutters:
  - 1. Material: Prefinished Aluminum.

2. Thickness: 20 gauge/0.0320 inches.
  3. Color: Custom color in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
  4. Seaming: Fully-welded shop fabricated corners and end dams.
- F . Downspouts:
1. Material: Prefinished Aluminum.
  2. Thickness: 20 gauge/0.0320 inches.
  3. Color: Custom color in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
  4. Seaming: Fully-welded shop fabricated corners and end dams.
- G . Window Head Flashing:
1. Material: Prefinished Aluminum.
  2. Thickness: 20 gauge/0.032 inches.
  3. Color: To be selected from manufacture's standard colors.
  4. Seaming: Fully-welded shop fabricated corners and end dams.
- H . Coping, Cap, Parapet, Sill and Ledge flashings:
1. Material: Prefinished Aluminum.
  2. Thickness: 20 gauge/0.0320 inches
  3. Color: To be selected from manufacture's standard colors.
  4. Seaming: Butt joint with concealed splice plates.
  5. Corners: Fully-welded shop fabricated corners, ends and intersections.
- I . Pre-finished Metal Sill Flashing:
1. Material: Prefinished Aluminum.
  2. Thickness: 20 gauge/0.0320 inches
  3. Color: To be selected from manufacture's standard colors.
  4. Seaming: Butt joint with concealed splice plates.
  5. Corners: Fully-welded shop fabricated corners, ends and intersections.
- J . Pre-finished Aluminum Trim:
1. Material: Prefinished Aluminum.
  2. Thickness: 20 gauge/0.0320 inches
  3. Color: To be selected from manufacture's standard colors.
  4. Seaming: Butt joint with concealed splice plates.
  5. Corners: Fully-welded shop fabricated corners, ends and intersections.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Equipment rails and pedestals.

### 1.2 RELATED REQUIREMENTS

- A . 07 54 00 - Thermoplastic Membrane Roofing: For roofing system accessories are incorporated into.
- B . 07 62 00 - Sheet Metal Flashing and Trim: For formed metal roof accessories.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.
- B . Product Data: Provide product criteria, characteristics, accessories, jointing and flashing methods.
- C . Shop Drawings: Indicate required flashings, curbs and conditions for tie into roofing membrane.
- D . Certificate: For smoke hatches, provide certificate of approval from authority having jurisdiction.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's operation and materials.
  - 2. Recommendations on maintenance schedule.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
- B . Manufacturer Warranty: Provide 2 year warranty for failing to resist penetration of water.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies.

2.2 MATERIALS

- A . Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
- B . Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.

2.3 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 ADJUSTING

- A . Adjust and lubricate hardware for proper operation.

3.5 CLEANING

- A . Remove protective material from prefinished aluminum surfaces.
- B . Wash down exposed surfaces; wipe surfaces clean.
- C . Remove excess sealant.

### 3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Penetration firestopping.
- B . Fire resistive joint systems.

### 1.2 RELATED REQUIREMENTS

- A . 09 21 16 - Gypsum Board Assemblies: For fire rated assemblies requiring firestopping.
- B . Divisions 21-28: For items typically penetrating fire rated assemblies requiring firestopping.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer and fabricator.
- B . Product Data: Provide product criteria, characteristics, accessories, and jointing methods, and termination conditions.
- C . Shop Drawings: Indicate system design listing by UL, FM Research, Intertek Testing Services, Omega Point Laboratories (OPL).
  - 1. Where system design listing is not available for a particular configuration provide an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRR) for submittal
- D . Contractor Installation log.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer of firestop products shall have been successfully producing and supplying these products for a period of not less than 3 years, and be able to show evidence of at least 10 projects where similar products have been installed and accepted.
- B . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

## 1.6 MOCKUP

- A . Prior to installing firestopping, erect mockups for each different firestop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
1. Locate mockups on site in locations indicated or, if not indicated, as directed by Owner.
  2. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work. Accepted mockups in an undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

## 1.7 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work within a five year period after Date of Substantial Completion.
- B . Manufacturer Warranty: Provide five year warranty for firestopping systems.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Interior Firestopping: Provide firestopping of all joints head of walls and penetrations in fire-resistance rated and smoke-resistant assemblies. Single source installer.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Penetrations: Provide firestopping systems that resist the spread of fire, and the passage of smoke and other gases according to requirements indicated:
1. Firestop all penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.
  2. Provide complete penetration firestopping systems that have been tested and approved by third party testing agency.
  3. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E814, but not less than one hour or the fire-resistance rating of the construction being penetrated.
  4. T - Rated Through-Penetration Firestop Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated by Code.
  5. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or ANSI/UL 1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.
  6. L - Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings, as determined per UL 1479, where indicated by Code.
  7. W - Rated Through-Penetration Firestop Systems: Provide firestop systems with W Water Resistance ratings, in addition to F, T and L ratings, as determined per UL 1479, where indicated.



- B . Perimeter Fire Containment Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, as determined per ASTM E2307, but not less than the fire-resistance rating of the floor construction.
- C . Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079, but not less than the fire-resistance rating of the construction in which the joint occurs.
- D . For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.
  - 1. Exposed to view firestopping must be paintable.
- E . Firestop material must be able to be installed per manufacturers written instructions in temperatures ranging from 35 degrees F to 120 degrees F, and have the ability to be frozen, thawed and still comply with its UL designation and testing results.
- F . Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
- G . Movement:
  - 1. Provide firestop sealants and fire resistive joint sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
  - 2. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E-1399, ASTM E1966, or ANSI/ UL 2079.
- H . Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
- I . Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.
- J . When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
- K . Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words "Chase Wall Optional".
- L . Provide penetration firestop systems, fire-resistive joint systems, or perimeter fire barrier systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL 1479 for penetrations and ANSI/UL 2079 for joint systems with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.

## 2.3 MANUFACTURERS

- A . Basis of Design: **3M Fire Protection Products** as listed in assemblies shown on Drawings or approved equal.

1. Comparable products by one of the following are also acceptable. See Section 01 60 00 - Product Requirements for submittal requirements.

#### 2.4 HEAD OF WALL ASSEMBLIES AT FIRE RESISTIVE JOINT ASSEMBLIES

- A. Metal Stud / Gypsum Board Partition Head-of-Wall Assembly:Based on UL assemblies listed on the Drawings.
  1. Track:
    - a. Basis of Design:Cemco "FAS Track DL2"; 20 gage (33 mil) track with factory installed intumescent seal; include "Fas Shaft Track DL2" for application at shaft wall assemblies; Include "Cemco Fas Strap" for installation of partitions against fluted metal decks; width as appropriate to flute spacing.

#### 2.5 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping.

#### 3.2 PREPARATION

- A. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.
- B. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.
- C. Verify that system components are clean, dry, and ready for installation.
- D. Verify that field dimensions are as shown on the Drawings and as recommended by the manufacturer.

#### 3.3 PENETRATION FIRESTOP INSTALLATION

- A. Ensure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed prior to installation of firestop assemblies.
- B. Ensure that partitions and all other construction that conceal penetrations are not erected prior to the installation of firestop and smoke seals.
- C. Install forming/damming materials and other accessories in accordance with manufacturers written instructions.

- D . Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
  - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
  - 2. Install materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed finish to produce smooth, uniform surfaces.

### 3.4 FIRESTOP JOINT SYSTEM INSTALLATION

- A . Install joint fillers to provide support of firestop materials during application.
- B . Provide at the position to produce the cross-sectional shapes and depths of installed firestop material relative to joint widths for optimum sealant movement capability and required fire-resistance.
- C . Install systems that result in firestop materials:
  - 1. Directly contacting and fully wetting joint substrates.
  - 2. Completely filling recesses provided for each joint configuration.
  - 3. Providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.
- D . Tool non-sag firestop materials immediately after application and prior to skinning begins. Form smooth, uniform beads of configuration indicated or required to:
  - 1. Produce fire-resistance rating.
  - 2. Eliminate air pockets.
  - 3. Ensure contact and adhesion with sides of joint.

### 3.5 INSTALLATION LOG

- A . Include the following items for all firestop and fire resistive joint installations:
  - 1. Contractor's name, address, and phone number.
  - 2. Through-penetration firestop systems designation of applicable testing and inspecting agency.
  - 3. Date of installation.
  - 4. Firestop systems manufacturer's name.
- B . Provide as a pdf file with bi-directional links to floor plans and elevations to clearly illustrate location of material.

### 3.6 IDENTIFICATION

- A . Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.

3.7 CLEANING

- A . Clean off excess fill materials and sealants adjacent to openings and joints as work progresses. Use methods and cleaning materials approved by manufacturers of firestopping products and or assemblies in which openings and joints occur.
- B . Protect firestopping during and after curing period from contact with contaminating substances.

3.8 SCHEDULE

- A . Refer to assemblies on drawings.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Sealants for exterior surfaces.
- B . Sealants for interior surfaces.

### 1.2 RELATED REQUIREMENTS

- A . 01 60 00 - Product Requirements: For substitution and additional product requirements.

### 1.3 SUBMITTALS

- A . Qualification Data: For Manufacturer, Installer, Testing Agency.
- B . Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C . Preliminary Selection Sample: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D . Field Samples for Confirmation: Provide sealant samples in the color selected based on Manufacturer's charts for sealants other than the ones included in the Visual and Performance Mockup. Field samples shall be minimum 12 inches long and installed at joints intended for each particular sealant use. Mockup and field samples will be used to confirm sealant color selection.
- E . Sanded sealant samples: Include in the Visual and Performance mockup, as part of the brick portion of the mockup.
- F . SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- G . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H . Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- I . Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- J . Field Test Report Log: For each elastomeric sealant application.

- K . Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- L . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- M . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

#### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project. Minimum 5 years of documented experience in facilities of this size and scope.
  - 1. Prequalification of single source installers for exterior sealants is encouraged.
- C . Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

#### 1.5 MOCKUP

- A . Construct mockup of 4 lineal feet of sealant at narrowest joint width and widest joint width, representing finished work including internal and external corners and control joints.
- B . Locate where directed.
- C . Mockup may remain as part of the Work.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

#### 1.7 WARRANTY

- A . Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B . Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Ten (10) years from date of Substantial Completion.

- C. Special warranties exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  2. Disintegration of joint substrates from natural causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Joint sealers for properly designed joints in interior and exterior materials; selected for durability, movement capacity, adhesion to substrates and non-staining characteristics.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- C. Elastomeric Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.

### 2.3 MANUFACTURERS

- A. Specification is based on products listed below.

### 2.4 MATERIALS

- A. Sealants for exterior surfaces:
1. (S-1): Silyl-terminated polyether elastomeric; ASTM C920, Grade NS, Class 25, Uses NT, M, G, A and O; single, or multi- component.
    - a. Color: Standard and custom colors matching finished surfaces.
    - b. Product: BASF MasterSeal NP 150
  2. (S-2): Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, general purpose, medium modulus, neutral curing, non-sagging, non-staining, non-bleeding.
    - a. Movement Capability: +/- 50 percent.
    - b. Color: Standard colors matching finished surfaces.

- c. Product: DOWSIL 795 manufactured by Dow.
    - d. Designed for weather-proofing typical exterior materials including unprimed adhesion to anodized and fluoropolymer coated aluminum.
  3. (S-3): Surface Modified Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, general purpose, medium modulus, neutral curing, non-sagging, non-staining, non-bleeding.
    - a. Movement Capability: +/- 50 percent.
    - b. Color: Standard colors matching finished surfaces.
    - c. Product: DOWSIL 756 manufactured by Dow.
    - d. Designed for weather-proofing sensitive porous stone and light colored metal panel substrates.
  4. (S-4): Butyl Sealant: ASTM C1311.
    - a. Movement Capability: Plus and minus 12-1/2 percent.
    - b. Product: Butyl Sealant by Tremco.
    - c. Designed for concealed joints requiring non-drying sealant like lap joints in sheet metal flashing and trim.
  5. (S-5): Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single or multi-component.
    - a. Movement Capability: +/- 25 percent.
    - b. Color: Color as selected to match concrete.
    - c. Product: THC 901 by Tremco Inc.
    - d. Designed for exposed, trafficked joints with pourable self-leveling installation.
  6. (S-6): Preformed Compressible Foam Sealers.
    - a. Movement +25 percent, -25 percent (50 percent total) - permanently elastic.
    - b. Color: Color as selected to match concrete.
    - c. Product: THC 901 by Tremco Inc.
      - 1) Backerseal by Emseal.
      - 2) illmod 600 by Tremco Inc.
- B. Sealants for interior surfaces:
  1. (S-10): General Purpose Interior Sealant: polyurethane; single, or multi- component, paintable.
    - a. Color: Standard colors matching finished surfaces.
    - b. Product: Dymonic FC, Dymeric 240FC by Tremco Inc.
    - c. Designed for interior movement and non-moving joints adjacent to painted surfaces.
  2. (S-11): Bathtub/Tile Sealant: Silicone; ASTM C920, Uses M and A; single component, mildew resistant.
    - a. Colors other than white may be required.
    - b. Product: DOWSIL Tub and Tile Sealant manufactured by Dow.
    - c. Sealant Used in Food preparation area must be USDA approved for that use.



3. (S-12): Acoustical Sealant: Acrylic sealant; ASTM C834.
  - a. Product: Tremco "Acoustical Sealant".
  - b. Non-hardening type.
  - c. Tested as part of acoustical assemblies.
4. (S-13): Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single or multi-component.
  - a. Approved by manufacturer for wide joints up to 1-1/2 inches.
  - b. Color: Standard colors matching finished surfaces.
  - c. Product: Vulkem 45 SSL by Tremco Inc.
  - d. Designed for exposed, trafficked joints with pourable self-leveling installation.

## 2.5 ACCESSORIES

### A . Joint sealant backing:

1. General:
  - a. Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Cylindrical Sealant Backings:
  - a. ASTM C1330, TypeC (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
3. Elastomeric Tubing Sealant Backings:
  - a. Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 degF. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
4. Bond-Breaker Tape:
  - a. Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

### B . Miscellaneous Materials:

1. Primer:
  - a. Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

2. Cleaners for Nonporous Surfaces:
    - a. Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
  3. Masking Tape:
    - a. Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
  4. Natural Sand:
    - a. Washed natural sand containing no contaminants that would affect the sealant. Color as approved by the architect for sanded joints as indicated or scheduled.
- C. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Joint Sanding: Sand sealant joints at brick and sidewalks.
  1. Immediately after tooling and prior to skinning over of sealant, broadcast sand onto surface of sealant.
  2. Retool by rolling a dowel over the joint to achieve sufficient embedment.
  3. Maintain uniform appearance.

#### 3.4 FIELD QUALITY CONTROL

- A. Field quality control to include field adhesion testing, field stain testing, test methods and evaluation of field test results.
- B. Perform all corrections necessary for issuance of warranty.

#### 3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

#### 3.6 SCHEDULE

- A. Sealants for exterior surfaces.

1. (S-1): Exterior joints occurring in paintable surfaces.
2. (S-2): Typical exterior weather-proofing joints including metal to metal, metal to glass and perimeters.
3. (S-3): Exterior weather-proofing joints including porous natural stone, unit masonry, veneer masonry, and concrete applications.
4. (S-3a): Exterior weather-proofing joints at ledger angles in masonry veneer. Sand appearance to match brick mortar appearance. Matching may require several iterations.
5. (S-4): Concealed sealants in sheet metal flashing, metal work and other joints calling for nonhardening, nonskinning, non-drying, nonmigrating sealant.
6. (S-5): Joints in sidewalks and other concrete paving. Provide sanded joints.
7. (S-6): Used as a secondary sealant behind directly-applied liquid sealant. Use at all joints larger than 3/4 inch in width as a secondary sealant.

B. Sealants for interior surfaces:

1. (S-10): Typical Interior Sealant: Moving and non-moving Interior wall and ceiling control joints, smoke rated (but not fire rated) partitions.
2. (S-11): Joints between plumbing fixtures and floor and wall surfaces. Joints between kitchen, laundry room and bath countertops and wall surfaces.
3. (S-12): Use for concealed locations only. Sealant bead between top stud runner and structure and between bottom stud track and floor at any wall designated as acoustical.
4. (S-13): Control joints in floors.
5. Acoustical sealants.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Fire rated steel doors.
- B . Interior smoke and draft control doors.
- C . Fire rated steel frames.
- D . Exterior steel frames.

### 1.2 RELATED REQUIREMENTS

- A . 09 90 00 - Painting and Coating: For field painting.

### 1.3 SUBMITTALS

- A . Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes. Include U-value data for thermally broken doors and frames.
- B . Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- E . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Hollow metal frames for hollow metal doors, wood doors and glazing. Hollow metal doors for fire rated, non-fire rated, and insulated openings.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Accessibility Requirements: For doors required to be accessible, comply with applicable provisions in the Accessible and Usable Building Facilities ICC A117.1 and 2010 ADA Standards for Accessible Design – Department of Justice.
- B . Comply with ANSI A250.8 in general and for grade and style specified.
- C . NAAMM HMMA doors of equivalent or better construction are allowed.

### 2.3 MANUFACTURERS

- A . Specification is based on Doors and Frames by one of the following:
  - 1. Assa Abloy.
  - 2. Ceco.
  - 3. Curries.
  - 4. Fleming.
  - 5. Steelcraft.

### 2.4 MATERIALS

- A . Fire rated steel doors.
  - 1. Performance Criteria:
    - a. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
      - 1) Provide units listed and labeled by UL.
      - 2) Attach fire rating label to each fire rated unit.
    - b. Grade: ANSI A250.8 Level 3, physical performance Level C, Model 2, seamless.
    - c. Thickness: 1-3/4 inches.
    - d. Exterior Doors, Fire Rated:
      - 1) Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M with manufacturer's standard coating thickness.
      - 2) Insulating Value: U-value of 0.29, when tested in accordance with ASTM C1363.
  - 2. Features:
    - a. Door Top and Closures: Steel, Flush with top of faces and edges.
    - b. Door Edge Profile: Beveled on both edges.
    - c. Face Texture: Smooth.

- d. Glazed Lights: Sizes and configurations as indicated on drawings. Provide secure glazing stops on secure side of door.
  - 1) Glazing: In accordance with ICC (IBC)-2012 716 Tables.
- e. Color: To be selected from manufacturer's full range.
- f. Finish: Factory primed for field finishing.

**B . Interior Smoke and Draft Control Doors**

- 1. (Indicated as "S" on Drawings): Same construction as fire rated doors with indicated fire rating, plus:
- 2. Maximum Air Leakage: 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
- 3. Gasketing: No added gasketing or seals allowed.
- 4. Label: UL "S" label.

**C . Fire Rated Frames:**

- 1. Performance Criteria:
  - a. Comply with the requirements of grade specified for corresponding door.
  - b. Fire Rating: Same as door, labeled, tested in accordance with UL 10C ("positive pressure").
  - c. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 2.
  - d. Frames for Glass: Comply with frame requirements specified in ANSI A250.8 for Level 1, 18 gage.
- 2. Features:
  - a. Assembly: Fully welded.
  - b. Finish: Factory primed, for field finishing.

**D . Exterior Frames:**

- 1. Performance Criteria:
  - a. Comply with the requirements of grade specified for corresponding door.
  - b. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
  - c. Provide with true thermal break.
- 2. Features:
  - a. Assembly: Fully welded.
  - b. Finish: Factory primed, for field finishing.

**2.5 ACCESSORIES**

**A .** All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**B .** Glazing: As specified in Section 08 80 00 - Glazing, factory installed.

- C . Mineral Fiber Insulation: For filling frame cavities.

## 2.6 FINISHING

- A . Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B . Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.
- C . Field Finish: In accordance with Section 09 90 00 - Painting and Coating.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.
- B . Coat inside of frames to be installed in masonry, with bituminous coating, prior to installation.
- C . Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- C . Install fire rated units in accordance with NFPA 80.
- D . Seal seam at top closures after finish is applied to create a smooth surface without groove or pits.
  - 1. Seal with sealant Per Section 07 90 05 - Joint Sealers.
- E . Pack all frames with insulation.
- F . Coordinate installation of hardware.
- G . Coordinate installation of electrical connections to electrical hardware items.
- H . Touch up damaged factory finishes.

### 3.4 TOLERANCES

- A . Clearances Between Door and Frame: As specified in ANSI A250.8.
- B . Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING

- A . Adjust and lubricate hardware for proper operation.
- B . Adjust for smooth and balanced door movement in accordance with manufacturer's instructions.

3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

3.7 SCHEDULE

- A . Refer to door schedule on drawings.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Non-fire rated wood doors.
- B . Fire rated wood doors.

### 1.2 RELATED REQUIREMENTS

- A . 08 11 13 - Hollow Metal Doors and Frames: For frames.
- B . 09 90 00 - Painting and Coating: For field painting.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer.
- B . Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C . Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles.
- D . Sample: Submit two samples face material, manufacturer's standard size showing factory finishes, colors, and surface texture.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
  - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## 1.6 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
  - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Wood doors for fire-rated and non-fire rated openings.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Accessibility Requirements: For doors required to be accessible, comply with applicable provisions in the Accessible and Usable Building Facilities ICC A117.1 and 2010 ADA Standards for Accessible Design – Department of Justice.
- B. Quality Level: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S. 1A for all doors with the following exceptions.
- C. Construction: Flush.
- D. Vertical Edges: Same species as face veneer.
- E. Edge type (AWI "E" type) edge set in between door face veneers.
- F. Door Edge Profile: Beveled on both edges.
- G. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- H. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- I. Source Limitations: For doors and frames, obtain products from single source from single manufacturer.

### 2.3 MANUFACTURERS

- A. Specification is based on doors and frames by one of the following:
  - 1. Masonite Architectural: Graham-Maiman Wood Doors [architectural.masonite.com/graham-maiman/flush-wood-doors/](http://architectural.masonite.com/graham-maiman/flush-wood-doors/)
  - 2. Lynden Doors: [www.lyndendoor.com](http://www.lyndendoor.com)
  - 3. VT Industries, Inc: [www.vtindustries.com](http://www.vtindustries.com)
- B. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.

## 2.4 MATERIALS

### A. Wood Veneer Facing:

1. Wood Veneer Facing for Transparent Finish: Vertical Grain Fir, quarter sawn, slip matched, veneer grade as specified by quality standard.

### B. Cores:

1. Cores Constructed with stiles and rails:
  - a. Provide solid blocks[ ] for hardware reinforcement.
  - b. Provide solid blocking for other throughbolted hardware.
2. Non-Rated Solid Core and 20 Minute Rated Doors: Type: No Added Urea Formaldehyde particleboard core (PC), plies and faces as indicated above.
3. Sound Retardant Core: Equivalent to Type PC construction with core as required to achieve rating specified; plies and faces as indicated above.

### C. Non-fire rated wood doors.

1. Features:
  - a. Thickness: 1-3/4 inches.
  - b. Core: Solid.
  - c. Facing Material:
    - 1) Wood veneer facing with factory transparent finish.
    - 2) Wood veneer facing with factory opaque finish.
    - 3) High pressure decorative laminate finish.
  - d. Color/Finish: To be selected from manufacturer's full range.
  - e. Glazed Lights: Sizes and configurations as indicated on drawings. Provide secure glazing stops on secure side of door.

### D. Fire-rated wood doors.

1. Performance Criteria:
  - a. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
    - 1) Provide units listed and labeled by UL.
    - 2) Attach fire rating label to each fire rated unit.
  - b. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code ("positive pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
2. Features:
  - a. Thickness: 1-3/4 inches.
  - b. Core: Fire rated as required to meet performance criteria.
  - c. Facing Material:
    - 1) Wood veneer facing with factory transparent finish.
    - 2) Wood veneer facing with factory opaque finish.

- 3) High pressure decorative laminate finish.
- d. Glazed Lights: Sizes and configurations as indicated on drawings. Provide secure glazing stops on secure side of door.
- e. Color/Finish: To be selected by Architect from manufacturer's full range.
- f. Glazed Lights: Sizes and configurations as indicated on drawings. Provide secure glazing stops on secure side of door.
- 1) Glazing: In accordance with ICC (IBC)-2012 716 Tables.

## 2.5 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## 2.6 FINISHING

- A. Factory Finish: Finish work in accordance with AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
  - 1. Transparent:
    - a. System - 11, Polyurethane, Catalyzed.
    - b. Stain: To match sample.
    - c. Sheen: Semigloss.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Field-Finished Doors: Trimming to fit is acceptable.
  - 1. Adjust width of non-rated doors by cutting equally on both jamb edges.
  - 2. Trim maximum of 3/4 inch off bottom edges.
- C. Coordinate installation of hardware.
- D. Touch up damaged finishes.

### 3.3 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

### 3.4 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.

B . Adjust for smooth and balanced door movement in accordance with manufacturer's instructions.

3.5 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

3.6 SCHEDULE

A . Refer to door schedule on drawings.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Wall access doors and panels.
- B . Ceiling access doors and panels.

### 1.2 RELATED REQUIREMENTS

- A . 09 21 16 - Gypsum Board Assemblies: Openings in partitions and finishing of recessed access doors.
- B . 09 90 00 - Painting and Coating: Field paint finish.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer.
- B . Sample: Submit one of each access unit, 12 x 12 inch in size illustrating frame configuration.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
- E . Closeout Submittals: Project record documents recording actual locations of all access units.

### 1.4 MAINTENANCE MATERIAL

- A . Any special tools to operate access doors and panels.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Fire rated and non-rated hinged doors and non-hinged panels in walls, ceilings, and floors for access to concealed building components.

## 2.2 MANUFACTURERS

A . Specification is based on products listed below.

## 2.3 MATERIALS

A . Wall access doors and panels.

1. Recessed Non-Fire Rated Door and Frame Units:
  - a. Basis of Design:
    - 1) In Gypsum Board on Steel Studs:
      - a) Model RW-Series manufactured by Nystrom, Inc.
  - b. Features:
    - 1) Frame: Drywall bead.
    - 2) Hinges: Concealed.
    - 3) Handle: No Handle.
    - 4) Latch/Lock: Screw driver slot for quarter turn cam latch.
    - 5) Gasketing: Manufacturers' standard.
    - 6) Material: Galvanized Steel.
    - 7) Finish: Prime painted for field finish.
    - 8) Size(s): As indicated.
2. Recessed Fire Rated Door and Frame Units:
  - a. Basis of Design:
    - 1) In Cast-In-Place Concrete or Tile:
      - a) Model U-Series manufactured by Nystrom, Inc.
    - 2) In Gypsum Board on Steel Studs:
      - a) Model RW-Series manufactured by Nystrom, Inc.
      - b) Model KRP350 FR manufactured by Karp Associates.
  - b. Performance Criteria:
    - 1) Provide required options to maintain fire rating of assembly.
  - c. Features:
    - 1) Frame: Drywall bead.
    - 2) Hinges: Concealed.
    - 3) Handle: No Handle.
    - 4) Latch/Lock: Screw driver slot for quarter turn cam latch.
    - 5) Gasketing: Manufacturers' standard.
    - 6) Material: Galvanized Steel.
    - 7) Finish: Prime painted for field finish.
    - 8) Size(s): As indicated.

B . Ceiling access doors and panels.

1. Recessed Non-Fire Rated Door and Frame Units:
  - a. Basis of Design:
    - 1) In Gypsum Board on Steel Studs:
      - a) Model RW-Series manufactured by Nystrom, Inc.
  - b. Features:
    - 1) Hinges: Concealed.
    - 2) Handle: No Handle.
    - 3) Latch/Lock: Screw driver slot for quarter turn cam latch.
    - 4) Gasketing: Manufacturers' standard.
    - 5) Material: Galvanized Steel.
    - 6) Finish: Prime painted for field finish.
    - 7) Size(s): As indicated.
2. Recessed Fire Rated Door and Frame Units:
  - a. Basis of Design:
    - 1) In Cast-In-Place Concrete or Tile:
      - a) Model U-Series manufactured by Nystrom, Inc.
    - 2) In Gypsum Board on Steel Studs:
      - a) Model RW-Series manufactured by Nystrom, Inc.
      - b) Model KRP350 FR manufactured by Karp Associates.
  - b. Performance Criteria:
    - 1) Provide required options to maintain fire rating of assembly.
  - c. Features:
    - 1) Hinges: Concealed.
    - 2) Handle: No Handle.
    - 3) Latch/Lock: Screw driver slot for quarter turn cam latch.
    - 4) Gasketing: Manufacturers' standard.
    - 5) Material: Galvanized Steel.
    - 6) Finish: Prime painted for field finish.
    - 7) Size(s): As indicated.

## 2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.



### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install frames plumb and level in openings.

### 3.4 ADJUSTING

- A . Adjust and lubricate hardware for proper operation.

### 3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

### 3.6 SCHEDULE

- A . Typical: Recessed Non-Fire Rated Door and Frame Unit.
- B . Fire Rated Assemblies: Recessed Fire Rated Door and Frame Units.

END OF SECTION

## **PART 1 - GENERAL**

1. SECTION INCLUDES
  - a. Delegated design of folding-sliding doors.
  - b. Folding-sliding doors, with vision glass.
2. RELATED REQUIREMENTS
  - a. 079005 - Joint Sealers: Perimeter sealant and back-up materials.
  - b. 087100 - Door Hardware: Hardware items other than specified in this section.
  - c. 088000 - Glazing: Glass and glazing accessories.
3. ADMINISTRATIVE REQUIREMENTS
  - a. Coordinate with installation of other components that comprise the exterior enclosure.
  - b. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
4. SUBMITTALS
  - a. Qualification Data: For Installer, manufacturer and design engineer.
  - b. Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - c. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
  - d. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required. Indicate required flashings, sealing at openings.
  - e. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
  - f. Sample: Submit two samples 8 by 10 inches in size illustrating finished wood, aluminum surface, glass, glazing materials.
  - g. Accessory Material VOC Content Certification: Form completed in accordance with Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
  - h. Maintenance Data: For users operation and maintenance of system including:
    - 1) Methods for maintaining system's materials and finishes.
    - 2) Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

5. QUALITY ASSURANCE

- a. Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years experience.
- b. Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- c. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience.

6. DELIVERY, STORAGE, AND HANDLING

- a. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

7. FIELD CONDITIONS

- a. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

8. WARRANTY

- a. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- b. Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
  - 1) Panel Finish Criteria are listed AAMA 2605.

**PART 2 - PRODUCTS**

1. DESCRIPTION

- a. Factory fabricated, factory finished aluminum framing members with infill, that operate in a folding, sliding, stacking configuration.

2. MANUFACTURERS

- A. Basis of Design: FF300 Glazed Door manufactured by Door Engineering Sectional Door or approved equal.

1. PERFORMANCE AND DESIGN CRITERIA

- a. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
  - 1) Design Wind Loads: Comply with requirements of the requirements of ASCE 7.
  - 2) Size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
  - 3) Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

- b. Movement: Accommodate movement between folding-sliding doors and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- c. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft (0.3 L/s/sq m) of wall area, measured at specified differential pressure across assembly in accordance with ASTM E283.
- d. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.
- e. Thermal Performance Requirements:
  - 1) Condensation Resistance Factor: 71, minimum, measured in accordance with AAMA 1503, using clear 1 inch (25 mm) thick sealed insulating glass.
  - 2) Overall U-value Vision Glazing: 0.35 Btu/(hr sq ft deg F) (1.99 W/(sq m K)), maximum.
  - 3) NFRC 100 tested and labeled to meet submittal and document requirements of local energy codes.
- f. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
- g. Sill: Recessed for ADA compliance.

## 2. MATERIALS

- B. Steel Doors: Stile and rail steel with glazed panels, insulated; side opening operating style with track and hardware; steel complying with ASTM A1011/A1011M.
  - 1. Door Panels: Steel construction, with steel sheet; 14-gauge, 0.0747 inch minimum thickness and welded joints; rabbeted weather joints at meeting rails.
  - 2. Window Frame: Manufacturer's standard, finish to match exterior/interior color.
  - 3. Doors shall be designed to withstand external or internal horizontal wind loads of 120mph (3 second gust) per ASCE 7-16. The maximum allowable deflection shall not exceed 1/120 of the span. Fiber stresses in main members shall be limited to 27,000 pounds per square inch. Steel frames shall be designed in accordance with the AISC "Steel Construction Manual".
  - 4. Door Nominal Thickness: 1-5/8-inch.
  - 5. Overall Door Height and Width: As indicated on drawings.
  - 6. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum.
  - 7. Exterior Finish: Factory finished with acrylic baked enamel; Color to match RAL 3003 Ruby Red.
  - 8. Interior Finish: Factory finished with acrylic baked enamel; match exterior color.
  - 9. Glazed Lights: Two, 2-foot x 4-foot nominal, insulated glazed lights per panel; set in place with manufacturer's standard installation.
  - 10. Operation: Automatic, electric powered.

- a. ded aluminum, one piece per door opening, ribbed surface; provide on all doors.

11. FABRICATION

- a. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- b. Accurately fit and secure joints and corners. Make joints flush, hairline.
- c. Prepare components to receive anchor devices. Fabricate anchors.
- d. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- e. Arrange fasteners and attachments to conceal from view.
- f. Reinforce interior horizontal head rail to receive blind track brackets and attachments.
- g. Reinforce components internally for door hardware.
- h. Reinforce framing members for imposed loads.

**PART 3 - EXECUTION**

1. EXAMINATION

- a. Verify dimensions, tolerances, and method of attachment with other work.
- b. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

2. INSTALLATION

- a. Install folding-sliding door system in accordance with manufacturer's instructions.
- b. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- c. Provide alignment attachments and shims to permanently fasten system to building structure.
- d. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- e. Provide thermal isolation where components penetrate or disrupt building insulation.
- f. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- g. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- h. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- i. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- j. Set thresholds and secure.

- k. See Section 087100 - Door Hardware for hardware installation requirements.
  - l. Install glass in accordance with Section 088000 - Glazing, using gasket type glazing method.
  - m. Install perimeter sealant in accordance with Section 079005 - Joint Sealers.
  - n. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
3. TOLERANCES
- a. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.
  - b. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).
4. FIELD QUALITY CONTROL
- a. See Section 014000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
  - b. Test installed folding-sliding doors system for water leakage in accordance with AAMA 501.2.
5. ADJUSTING
- a. Adjust operating hardware for smooth operation.
6. CLEANING
- a. Remove protective material from pre-finished aluminum surfaces.
  - b. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
  - c. Remove excess sealant by method acceptable to sealant manufacturer.
7. PROTECTION
- a. Protect installed products from damage during subsequent construction.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Overhead sectional doors, electrically operated.
- B . Operating hardware and supports.
- C . Electrical controls.

### 1.2 RELATED REQUIREMENTS

- A . 05 50 00 - Metal Fabrications: Steel channel opening frame.
- B . 06 10 00 - Rough Carpentry: Rough wood framing for door opening.
- C . 07 90 05 - Joint Sealers: Perimeter sealant and backup materials.
- D . 08 71 00 - Door Hardware: Lock cylinders.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.
- B . Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C . Product Data: Show component construction, anchorage method, and hardware.
- D . Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E . Maintenance Data: Include data for transmission, shaft and gearing, lubrication frequency, spare part sources.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum of 3 years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A. Motorized sectional doors that operate vertically.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.
- B. Visible Light Transmission: 0.36 minimum.
- C. Air Infiltration:
  - 1. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.04 cfm/sq. ft. of fixed wall area as determined according to ASTM E283 at a minimum static-air-pressure differential of 12 lbf/sq. ft.
- D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
  - 2. Test Interior Ambient-Air Temperature: 75 deg F.
  - 3. Test Performance: No buckling; stress on glass; sealant failure; or excess stress on framing, anchors, and fasteners; and no reduction of performance when tested according to AAMA 501.5.

2.3 MATERIALS

- A. Sheet Steel:
  - 1. Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Aluminum Sheet:
  - 1. ASTM B209 (ASTM B209M), 5005 alloy, H14 temper, plain surface.
- C. Aluminum Extrusions:
  - 1. ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.4 STEEL DOORS

2.5 DOOR ASSEMBLY OH-1 AND 2-H

- A. Basis of Design: Overhead Door Company – Model 596 Thermacore sectional door or approved equal.
  - 1. Insulated Steel Sectional Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.



2. Operation Cycles: Door components and operators capable of operating for not less than 100,000. 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.
  3. Solid panels and Full vision glazing with manufacturer's standard, nonglazed panels at areas indicated on drawings.
  4. Track Configuration: Vertical track.
  5. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.
  6. Windows: As indicated on drawings; in row(s) at height indicated on Drawings; installed with glazing of the following type:
    - a. Insulating Glass: Manufacturer's standard – clear.
  7. Roller-Tire Material: Manufacturer's standard.
  8. Locking Devices: Equip door with locking device assembly and chain lock keeper.
  9. Counterbalance Type: Torsion spring.
  10. Manual Door Operator: Chain-hoist operator.
- B. Electric Door Operator:
1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
  2. Operator Type: Manufacturer's standard for door requirements.
  3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
  4. Motor Exposure: Interior, clean, and dry.
  5. Emergency Manual Operation: Chain type.
  6. Obstruction-Detection Device: Automatic photoelectric sensor.
    - a. Sensor Edge Bulb Color: As selected by Architect from manufacturer's full range.
  7. Control Station: Where indicated on Drawings.
  8. Other Equipment: Portable, radio-control system.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

#### **3.2 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

- D . Fit and align door assembly including hardware.
- E . Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 079005.
- F . Install perimeter trim and closures.

### 3.3 TOLERANCES

- A . Maximum Variation from Plumb: 1/16 inch.
- B . Maximum Variation from Level: 1/16 inch.
- C . Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D . Maintain dimensional tolerances and alignment with adjacent work.

### 3.4 ADJUSTING

- A . Adjust door assembly for smooth operation and full contact with weatherstripping.

### 3.5 CLEANING

- A . Remove temporary labels and visible markings.

### 3.6 PROTECTION

- A . Protect installed products from damage during subsequent construction.
- B . Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Delegated design of storefront and entrances.
- B . Exterior storefront and entrances.
- C . Interior storefront and entrances.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: For finishes on storefront systems.
- B . 07 25 00 - Weather Barriers: For adjacent components of continuous building air barrier requiring tie into work of this section.
- C . 07 62 00 - Sheet Metal Flashing and Trim: For adjacent flashings and trim.
- D . 08 80 00 - Glazing: For glass infill.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 PRECONSTRUCTION TESTING

- A . Preconstruction Testing Service: Provide glazed storefronts that comply with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing or of tests performed on manufacturer's standard assemblies by a qualified testing agency.
- B . Preconstruction Sealant Testing: Perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition.
  - 1. Test a minimum five production-run samples each of metal, glazing, and other material.
  - 2. Prepare samples using techniques and primers required for installed assemblies.
  - 3. Perform tests under environmental conditions that duplicate those under which assemblies will be installed.
  - 4. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

## 1.5 SUBMITTALS

- A . Product Data: Provide product criteria, characteristics, accessories, material descriptions, dimensions of individual components and profiles, and finishes.
  - 1. Include sealants tested and approved as part of entrance and storefront system.
  - 2. Indicate glazed storefronts comply with performance requirements indicated, as evidenced by tests performed on manufacturer's standard assemblies by a qualified testing agency
- B . Qualification Data: For manufacturer, installer, and design engineer.
- C . Early Performance Criteria Design Submittal: Submit design package identifying the following criteria, used to design aluminum framed entrances and storefront systems:
  - 1. Load criteria, including seismic load criteria, wind load criteria.
  - 2. Design Loads, including wind loads at typical locations and corners, corner zone width, glass dead load, and glazing makeup.
  - 3. Anticipated movements, including the following:
    - a. Horizontal Joint Movement:
      - 1) Live load deflection.
      - 2) Thermal expansion.
      - 3) Long-term DL creep.
      - 4) Column shortening.
      - 5) Total Movement.
    - b. Elastic Story Drift.
    - c. Lateral Drift.
    - d. Parallel-to-Wall Deflection.
    - e. Cantilever Deflection of Framing Members.
- D . Delegated-Design Submittal: : For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Include plans, elevations, sections, full-size details, and attachments to other work. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior. Relationship to the work of others shall be clearly indicated when necessary to coordinate the work with other building trades,
- E . Energy Performance Certificates: Certificates are required for this project including project specific frame types, spacer types and glass types. Project specific reports substantiate U-value, visual light transmission, and solar heat gain values required by the Energy Code for the project.
  - 1. For projects following the Energy Code - Prescriptive Path: Submit NFRC Report with gateway sizes indicating compliance with requirements.
  - 2. For projects following the Energy Code - Performance Path: Submit CMAST bid reports at time of product submittal. Prior to glazed assembly installation, submit NFRC-CMAST label certificates for the designed assemblies (not gateway sizes). Provide finite element computer thermal modeling and calculations per NFRC 100 and NFRC 200, using DOE/LBNL THERM 5.2 and WINDOWS 5.2 software.

- F . Shop Drawings: 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 Storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage templates and details.
    - c. Interface with adjoining building construction.
    - d. Referenced to detail numbers indicated on the Contract Drawings.
    - e. Expansion and seismic provisions.
    - f. Glazing.
    - g. Entrance Systems.
- G . Coordination Drawings: Show tie-back and intermittent stabilization anchors.
  - 1. Include required slab edge configuration, post tensioning locations, embedded or surface attachment anchors and channels, structural supports such as steel posts and girts, and door locations.
- H . Product Test Reports:
  - 1. Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed storefronts, indicating compliance with performance requirements.
- I . Sample: For each type of exposed finish required, in manufacturer's standard sizes.
- J . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- K . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- L . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.
  - 4. Include ASTM C1401 recommendations for postinstallation-phase quality-control program.

## 1.6 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.

- C . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

#### 1.8 WARRANTY

- A . Manufacturer's Finish Warranty: Correct defective work within a 10 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
  - 1. Finish Criteria are listed AAMA 2605.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Factory fabricated and finished aluminum framing system with infill, and related flashings, anchorage and attachment devices. Systems do not typically equalize pressure or manage water intrusion within the system and are designed to bear on floor plates and be less than 12 feet tall.

#### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . The storefront system begins at the primary structural members of the building frame and the edges of concrete slabs, include all support embeds, plates, angles and ancillary framing members required for structural integrity and support of the Storefront from the building structure.
- B . The Drawings:
  - 1. Indicate the design intent for profile, joints and configuration required together with relationship to structural frame and interior building elements.
    - a. Drawings do not purport to identify or solve completely the problems of thermal or structural movement, pressure equalization, weep system, vapor retarder, fixings and anchorage, flatness and stability of facing, or moisture management.
- C . General Performance:
  - 1. Glazed storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    - c. Glazing-to-glazing contact.
    - d. Sealant failure.
    - e. Glass breakage.

- f. Noise or vibration created by wind and thermal and structural movements.
- g. Loosening or weakening of fasteners, attachments, and other components.
- h. Failure of operating units.

D. Structural Performance:

1. Wind Loads: Design and detail all members, connections and systems to meet the requirements of the current edition of the IBC and ASCE 7 and as modified by the structural notes.
  - a. Refer to Structural Drawings for structural design data requirements.
  - b. Damage limits: Design the element or system to meet the Immediate Occupancy Design Level.
  - c. Building Cladding: Load as calculated, but not less than 20 psf inward / outward pressures.
2. Deflection of Framing Members: At design wind pressure, as follows:
  - a. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding  $L/175$  of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to  $3/4$  inch, whichever is less.
    - 1) For spans over 13 feet 6 inches limit deflection to  $L/240 + 1/4$  inch.
  - b. Deflection Parallel to Glazing Plane: Limited to  $L/360$  of clear span or  $1/8$  inch, whichever is smaller.
  - c. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.
3. Story Drift (Interstory Movement): Accommodate design displacement of adjacent stories.
  - a. Design Displacement: As indicated on Structural Drawings.
  - b. Meets criteria for passing based on building occupancy type when tested per AAMA 501.4 and below.
    - 1) Run test procedure, apply and release loads through 10 cycles.
    - 2) Visually inspect the specimen at each displacement.
    - 3) Flex at anchors and racking of framing shall be recorded.
  - c. Lateral Interstory Movement (In plane of Construction):
    - 1) Test by applying a horizontal load to the frame supporting the mockup specimen, so as to induce a deflection in the mockup equivalent to the specified elastic interstory drift deflection.
    - 2) Result: There shall be no glass breakage, permanent deformation/damage to any component, anchor failures or structural failures.
    - 3) Result at 150 percent of design load: There shall be no fall-out or disengagement and release of any component.
  - d. Horizontal Interstory Movement (Normal to Construction):
    - 1) Test by applying a horizontal load to the frame supporting the mockup specimen, so as to induce a deflection in the mockup equivalent to the specified elastic interstory drift deflection.

- 2) Result: There shall be no glass breakage, permanent deformation/damage to any component, anchor failures or structural failures
- 3) Result at 150 percent of design load: There shall be no fall-out or disengagement and release of any component.
- e. Vertical Interstory Movement (Differential Deflection):
  - 1) Test for live load deflection by applying a vertical load to the frame supporting the mockup specimen, so as to induce a deflection in the mockup equivalent to the specified live load deflection.
  - 2) Result: There shall be no glass breakage, permanent deformation/damage to any component, anchor failures or structural failures.
  - 3) Result at 150 percent of design load: There shall be no fall-out or disengagement and release of any component.

E . Thermal Performance:

1. U-Value:
  - a. Prescriptive Energy Code Limits: Based on NFRC 100 gateway size.
    - 1) Fixed Glazing, including frame: U-value 0.45 maximum.
    - 2) Entrances: U-value 0.60 maximum.
  - b. The project is utilizing Total Building Performance approach to compliance with Washington State Energy Code. Prescriptive limits above are provided as benchmarks. Refer to SCHEDULE below for weighted averages based on energy models.
    - 1) U-Value, Maximum: For glass and frames, fixed and operable based on project specific opening sizes, configurations, frame types, spacer types and glass types. Advertised U-values substantiated by NFRC Bid Reports at time of bid.
    - 2) U-Value Maximums are subject to change as the energy model is updated.
2. Solar Heat Gain Coefficient (SHGC), Maximum: For the overall glazed assembly vision area and adjacent framing.
3. Visible Light Transmission (VLT), Minimum: For the overall glazed assembly vision area and adjacent framing.

F . Air Infiltration:

1. Air Infiltration: Maximum air leakage as determined according to ASTM E283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft:
  - a. Storefronts: 0.04 cfm/sq. ft. of fixed fixed glazing and framing areas.
  - b. Entrances: 0.03 cfm/sq. ft. of operable glazing and framing areas.

G . Water Leakage:

1. No evidence of water leakage per ASTM E331 at 12 psf.
2. Water leakage is defined as the appearance of any water on the interior side of any part of the glazed wall assembly, including the interface locations with adjacent envelope systems, that is not contained and drained back to the exterior, or that can cause damage to adjacent materials or finishes. Water fully contained in drained flashings, gutters, and sills is not considered water leakage.



H. Condensation Resistance Factor:

1. Fixed glazing and framing areas: NFRC-certified condensation resistance rating for framing and for glazing as determined according to AAMA 1503.
2. Glazing: Refer to Section 08 80 00 - Glazing

I. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Interior Ambient-Air Temperature: 75 deg F.
3. Test Performance: No buckling; stress on glass; sealant failure; or excess stress on framing, anchors, and fasteners; and no reduction of performance when tested according to AAMA 501.4.

J. Accessibility:

1. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum.
  - a. ANSI/ICC A117.1 - 309.4 Operation.

2.3 MANUFACTURERS

- A. Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

2.4 EXTERIOR STOREFRONT FRAMING SYSTEMS

- A. Basis of Design: Kawneer North America – 451UT; [www.kawneer.com](http://www.kawneer.com) or approved equal.

1. Thermally Broken Exterior Storefront:

B. Performance Requirements:

1. Maximum Assembly U-Value: 0.34.
2. Maximum Condensation Resistance Rating: 75.
3. Maximum Solar Heat Gain Coefficient: To be determined.
4. Minimum Visible Light Transmission: To be determined.
5. Structural Performance: ASTM E330/E330M.
6. Air Infiltration: ASTM E783.
7. Water Penetration: ASTM E1105.
8. Water Spray Test: AAMA 501.2.

2.5 GLAZING:

- A. Comply with Section 08 80 00 - Glazing.

- B. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types compatible with sealants and suitable for joint movement and assembly performance requirements.

- C. Weatherseal Sealant: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
  - 1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.6 FINISHES:

- A. High Performance Organic Coatings in accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.

## 2.7 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Concealed Flashing:
  - 1. Dead-soft, 0.018 inch thick stainless steel, ASTM A240/A240M of type recommended by manufacturer, or prefinished aluminum only.
- C. Framing Sealants:
  - 1. Manufacturer's standard sealants with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), and 100 percent silicone.
- D. Manufacturer's recommended compensation head channels.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

### 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed Storefronts to comply with the following nonaccumulating 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.
5. Allowances for cumulative effect of all tolerances (fabrication, assembly, thermal, seismic, building, and erection) and including the work of other sections, shall be made to ensure a weatherproof installation.

### 3.5 ADJUSTING

- A. Adjust operating windows, ventilators, hardware, and accessories for smooth function and tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
  1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

### 3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Fixed and Casement Fiberglass windows.
- B . Out-swing Hinged Glass Doors.

### 1.2 RELATED REQUIREMENTS

- A . 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer, installer, and design engineer.
- B . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C . Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements and indicate required flashings and sealing requirements at openings.
- D . Samples: Submit two samples of 6 inch long samples illustrating frame section. Submit two samples of all accessories and operating hardware.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.4 MAINTENANCE MATERIAL

- A . 3 sets of operating hardware.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A . Provide five year manufacturer warranty for window units, and replacement of same.
- B . Provide five year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Factory fabricated fiberglass windows including operating hardware, glazing and accessories.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Positive and Negative Design Wind Load: In accordance with general notes.
- B . Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding  $L/175$  of the glass edge length for each individual glazing lite 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  $L/360$  of clear span or  $1/8$  inch, whichever is smaller.
    - a. Operable Units: Provide a minimum  $1/16$ -inch clearance between framing members and operable units.
- C . U-Value: 0.55 minimum based on NFRC 100 gateway size.
- D . Air Infiltration:
  - 1. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.04 cfm/sq. ft. of fixed wall area as determined according to ASTM E283 at a minimum static-air-pressure differential of 8.3 lbf/sq. ft.
- E . Water Leakage:
  - 1. No evidence of water leakage per ASTM E331 at 8.3 psf.
  - 2. The appearance of any water on the interior side of any part of the glazed wall assembly, including the interface locations with adjacent envelope systems, that is not contained and drained back to the exterior, or that can cause damage to adjacent materials or finishes. Water fully contained in drained flashings, gutters, and sills is not considered water penetration.
- F . Condensation Resistance:
  - 1. Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.

- G . Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.
  2. Test Interior Ambient-Air Temperature: 75 degrees F.
  3. Test Performance: No buckling; stress on glass; sealant failure; or excess stress on framing, anchors, and fasteners; and no reduction of performance when tested according to AAMA 501.5.

## 2.3 MATERIALS

### A . Fixed and Casement Fiberglass Windows:

1. Basis of Design Product: Configurations indicated by **Cascadia Windows and Doors**. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
2. Features:
  - a. Glazing Location: Inside Glazed.
  - b. Reinforcing: As required to meet performance criteria and opening sizes indicated.
  - c. Dimensions and Configurations: As indicated.

### B . Out-swing Hinged Glass Doors:

1. Basis of Design Product: **Tuflite 500 Swing Door by Kawneer**. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
2. Performance Criteria:
  - a. ADA compliant with recessed sills.
  - b. High traffic, high abuse application.
3. Features:
  - a. Glazing Location: Inside Glazed.
  - b. Non-Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
  - c. Wall Thickness: 3/16-inch.
  - d. Sightline: 3-1/2-inch.
  - e. Top Rail: 5-inches.
  - f. Bottom Rail: 6-1/2-inches.
  - g. Stile Width: 5-inches with 2-inch deep door sections.
  - h. Door frame face width: 2-inches with depth of 4-1/2-inches.
  - i. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
  - j. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
  - k. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

- l. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- m. Factory Finish:
  - 1) Color: Black.
- 4. Hardware:
  - a. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.
  - b. Standard Tuffline Entrance Hardware:
    - 1) Weather-stripping:
      - a) Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
      - b) The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
    - 2) Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
    - 3) Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.
    - 4) Heavy Duty Offset Pivots.
    - 5) Butt Hinge: Full mortised 5-inches x 4-1/2-inches ball bearing type.
- 5. Access Control Entrance Hardware:
  - a. Stand alone Key Pad: AC-G43 Key Pad System – Kawneer Standard.
  - b. Stand alone Key Pad (with Optional Proximity Card Reader): AC-G44 Key Pad/ Reader (Note: Proximity Cards not included).
  - c. Proximity Cards.
  - d. Power supply for Exit Device: SP-2000 (One per pair. Max of 2 doors per power supply).
  - e. Exit Device: Kawneer Paneline EL, DOM 1690 and DOM 1790.
  - f. Power Transer: One per EL Exit Device required for access control.
  - g. Interior push button release.
  - h. Point to Point wiring diagram.
  - i. P

## 2.4 FABRICATION

- A. Fabricate aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufactures drawings and details.

2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 TOLERANCES

- A . Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.5 ADJUSTING

- A . Adjust and lubricate hardware for proper operation.

3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION



## SECTION 08 71 00 – DOOR HARDWARE

### PART 1 - GENERAL

#### 1.01 SUMMARY

##### A. Section includes:

1. Mechanical and electrified door hardware for:
  - a. Swinging doors.
2. Electronic access control system components

##### B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

##### C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
  - a. "Metal Doors and Frames"
  - b. "Flush Wood Doors"
  - c. "Entrances"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

#### 1.02 REFERENCES

##### A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

##### B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
  2. Recommended Locations for Builders Hardware
  3. Keying Systems and Nomenclature
  4. Installation Guide for Doors and Hardware
- C. NFPA – National Fire Protection Association
1. NFPA 70 – National Electric Code
  2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
  3. NFPA 101 – Life Safety Code
  4. NFPA 105 – Smoke and Draft Control Door Assemblies
  5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
  2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
  3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
  4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
  5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

### 1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
  - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

- a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:

- a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
- c. Indicate complete designations of each item required for each opening, include:
  - 1) Door Index: door number, heading number, and Architect's hardware set number.
  - 2) Quantity, type, style, function, size, and finish of each hardware item.
  - 3) Name and manufacturer of each item.
  - 4) Fastenings and other pertinent information.
  - 5) Location of each hardware set cross-referenced to indications on Drawings.
  - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
  - 7) Mounting locations for hardware.
  - 8) Door and frame sizes and materials.
  - 9) Degree of door swing and handing.
  - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:

- a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
- b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
  - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Factory order acknowledgement numbers (for warranty and service)
  - d. Name, address, and phone number of local representative for each manufacturer.
  - e. Parts list for each product.
  - f. Final approved hardware schedule edited to reflect conditions as installed.
  - g. Final keying schedule
  - h. Copies of floor plans with keying nomenclature
  - i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
  - j. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

#### 1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  - a. Warehousing Facilities: In Project's vicinity.
  - b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  - c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies like those indicated for this Project.
  - d. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
    - 1) Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.

- d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Pre-Installation Meetings
  1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      - 2) Preliminary key system schematic diagram.
      - 3) Requirements for key control system.
      - 4) Requirements for access control.
      - 5) Address for delivery of keys.
  2. Pre-installation Conference
    - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Inspect and discuss preparatory work performed by other trades.
    - c. Inspect and discuss electrical roughing-in for electrified door hardware.
    - d. Review sequence of operation for each type of electrified door hardware.
    - e. Review required testing, inspecting, and certifying procedures.
    - f. Review questions or concerns related to proper installation and adjustment of door hardware.
  3. Electrified Hardware Coordination Conference:
    - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

#### 1.07 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

### PART 2 - PRODUCTS

#### 2.01 HINGES

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Ives 5BB series
  - 2. Acceptable Manufacturers and Products:
    - a. Hager BB1191/1279 series
    - b. McKinney TA/T4A series
- B. Requirements:
  - 1. Provide hinges conforming to ANSI/BHMA A156.1.
  - 2. Provide five knuckle, ball bearing hinges.
  - 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
    - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
    - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

## 2.02 CONTINUOUS HINGES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Select
  - b. Stanley
  - c. Roton
  - d. ABH
  - e. Hager

### B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.

5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.03 MORTISE LOCKS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
  - a. Owners Standard

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified locksets that comply with the following requirements:
  - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
  - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
  - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
  - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
  - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.



## 2.04 CYLINDRICAL LOCKS – GRADE 1

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage ND series
2. Acceptable Manufacturers and Products:
  - a. Owners Standard

### B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

## 2.05 EXIT DEVICES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Von Duprin 98/35A series
2. Acceptable Manufacturers and Products:
  - a. Sargent 19-43-80 series
  - b. Falcon 25/24 series

### B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.

9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

## 2.06 PUSHBUTTONS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Locknetics IPB/MPB Series
2. Acceptable Manufacturers and Products:
  - a. Securitron PB2/PB4 Series
  - b. Camden CM-3000/9000 Series

### B. Requirements:

1. Provide push buttons as specified in hardware groups.

## 2.07 POWER SUPPLIES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:
  - a. Precision ELR series
  - b. Sargent 3500 series

### B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply,

location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.

3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
  - a. 12/24 VDC Output, field selectable.
  - b. Class 2 Rated power limited output.
  - c. Universal 120-240 VAC input.
  - d. Low voltage DC, regulated and filtered.
  - e. Polarized connector for distribution boards.
  - f. Fused primary input.
  - g. AC input and DC output monitoring circuit w/LED indicators.
  - h. Cover mounted AC Input indication.
  - i. Tested and certified to meet UL294.
  - j. NEMA 1 enclosure.
  - k. Hinged cover w/lock down screws.
  - l. High voltage protective cover.

## 2.08 CYLINDERS

1. Manufacturers and Products:
  - a. Scheduled Manufacturer and Product:
    - 1) Schlage Everest 29 S
  - b. Acceptable Manufacturers and Products:
    - 1) No Substitute
2. Requirements:
  - a. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
  - b. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
  - c. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
  - d. Nickel silver bottom pins.

## 2.09 KEYING

- A. Scheduled System:
  - a. Provide cylinders/cores keyed into Owner's existing Schlage Everest 29 key system
2. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
  - a. Master Keying system as directed by the Owner.
3. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.

4. Provide keys with the following features:
  - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
  - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
5. Identification:
  - a. Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
  - b. Identification stamping provisions must be approved by the Architect and Owner.
  - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
  - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
  - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
6. Quantity: Furnish in the following quantities.
  - a. Change (Day) Keys: 3 per cylinder/core.
  - b. Master Keys: 6.

## 2.10 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 4050A series
2. Acceptable Manufacturers and Products:
  - a. Falcon SC70A series
  - b. Norton 7500 series
3. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
4. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
5. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
6. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
7. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
8. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
9. Pressure Relief Valve (PRV) Technology: Not permitted.
10. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.11 DOOR TRIM

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives.
2. Acceptable Manufacturers:
  - a. Elmes
  - b. Trimco
  - c. Burns
  - d. Rockwood

### B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.12 PROTECTION PLATES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. Trimco
  - c. Rockwood

### B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.13 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturers:
  - a. Glynn-Johnson
2. Acceptable Manufacturers:
  - a. Rixson

- b. Sargent
- c. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

## 2.14 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Burns
  - c. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

## 2.15 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Zero International
2. Acceptable Manufacturers:
  - a. National Guard
  - b. Reese
  - c. Legacy
  - d. Pemko

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

## 2.16 SILENCERS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. Rockwood
  - c. Trimco

### B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

## 2.17 DOOR VIEWERS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Auth Chimes
  - b. Burns
  - c. Rockwood

- ### B. Provide appropriate door viewer for door type and rating with minimum of 180-degree view area.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- #### A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly

- construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
  - C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
  - D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
  - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
  - 2. Field modify and prepare existing doors and frames for new hardware being installed.
  - 3. When modifications are exposed to view, use concealed fasteners, when possible.
  - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
    - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
    - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
    - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

### 3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Custom Steel Doors and Frames: HMMA 831.
  - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.



- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- H. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- L. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- Q. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.04 FIELD QUALITY CONTROL

- A. Inspection and Testing:
  - 1. Provide functional testing and inspection of fire door assemblies by a qualified person in accordance with NFPA 80.
    - a. Schedule fire door assembly inspection within 90 days of Substantial Completion of the Project.
    - b. Submit a signed, written final report as specified in Paragraph 1.03.E.1.

- c. Correct all deficiencies and schedule a reinspection of fire door assemblies noted as deficient on the inspection report.
    - d. Inspector to reinspect fire door assemblies after repairs are made.
  2. Provide inspection of required egress door assemblies by a qualified person in accordance with NFPA 101.
    - a. Schedule egress door assembly inspection within 90 days of Substantial Completion of the Project for the required openings.
    - b. Submit a signed, written final report as specified in Paragraph 1.03.E.2.
    - c. Correct all deficiencies and schedule a reinspection of egress door assemblies noted as deficient on the inspection report.
    - d. Inspector to reinspect required egress door assemblies after repairs are made.

### 3.05 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.
  1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
  2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.07 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in

a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

END OF SECTION

Abbreviation	Name
B/O	By Others
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	Lcn Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
UNK	Unknown
VON	Von Duprin
ZER	Zero International Inc

**Hardware Group No. 01 – ROLL UP DOOR**

For use on Door #(s):

112B            128D            128E            128H            128I

Provide each RU door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
	HARDWARE	BY DOOR MFG		B/O

**Hardware Group No. 02**

For use on Door #(s):

112C

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA PANIC HARDWARE	98-NL	626	VON
1	EA RIM CYLINDER	20-057 EV29 T145	626	SCH
1	EA ELECTRIC STRIKE	6300 FSE	630	VON
1	EA SURFACE CLOSER	4050 SCUSH	689	LCN
1	EA 5TH SCREW SUPPORT	4050-30	689	LCN
1	EA KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA FLOOR STOP	FS18S	BLK	IVE
1	EA SEAL	429A	AL	ZER
1	EA DOOR SWEEP	39A	AL	ZER
1	EA THRESHOLD	655A MSLA-10	AL	ZER
1	EA CREDENTIAL READER	BY DIV 28		B/O
	POWER SUPPLY	BY DIV 28		B/O












CARD IN. USER PRESENTS CREDENTIAL, ELECTRIC STRIKE KEEPER RELEASES, USER OPENS DOOR TO ENTER.

**Hardware Group No. 03**

For use on Door #(s):

128C                      128F                      128G

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	98-NL		626	VON
1	EA	RIM CYLINDER	20-057 EV29 T145		626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE		630	VON
1	EA	SURFACE CLOSER	4050 SCUSH		689	LCN
1	EA	5TH SCREW SUPPORT	4050-30		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18S		BLK	IVE
1	EA	SEAL	429A		AL	ZER
1	EA	DOOR SWEEP	39A		AL	ZER
1	EA	THRESHOLD	655A MSLA-10		AL	ZER
1	EA	CREDENTIAL READER	BY DIV 28			B/O









CARD IN. USER PRESENTS CREDENTIAL, ELECTRIC STRIKE KEEPER RELEASES, USER OPENS DOOR TO ENTER.

**Hardware Group No. 04**

For use on Door #(s):

139B

Provide each SGL door(s) with the following:







QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO EV29 T145		626	SCH
1	EA	SURFACE CLOSER	4050 SHCUSH		689	LCN
1	EA	5TH SCREW SUPPORT	4050-30		689	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	SEAL	429A		AL	ZER
1	EA	DOOR SWEEP	8198AA		AL	ZER
1	EA	THRESHOLD	655A MSLA-10		AL	ZER

**Hardware Group No. 05**

For use on Door #(s):

118                      134                      114                      115                      116                      117

Provide each SGL door(s) with the following:









QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	PRIVACY LOCK	ND40S RHO		626	SCH
1	EA	SURFACE CLOSER	4050 RW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	SET	SEAL	488S-BK			ZER
1	EA	DOOR SWEEP	39A		AL	ZER

**Hardware Group No. 06**

For use on Door #(s):

110B                      111                      112A                      120                      122                      126  
 136A                      138B

Provide each SGL door(s) with the following:









QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8305 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4050 HW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	SEAL	429A		AL	ZER
1	EA	DOOR SWEEP	39A		AL	ZER

**Hardware Group No. 07**

For use on Door #(s):

128A                      128B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-06		626	VON
1	EA	RIM CYLINDER	20-057 EV29 T145		626	SCH
1	EA	SURFACE CLOSER	4050 RW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	SEAL	429A		AL	ZER
1	EA	DOOR SWEEP	39A		AL	ZER



**Hardware Group No. 11**

For use on Door #(s):

127 133

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80PD RHO EV29 T145		626	SCH
1	EA	ELECTRIC STRIKE	5100-3FP FSE		689	VON
1	EA	SURFACE CLOSER	4050 RW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	CREDENTIAL READER	BY DIV 28			B/O
		POWER SUPPLY	BY DIV 28			B/O

CARD IN. USER PRESENTS CREDENTIAL, ELECTRIC STRIKE KEEPER RELEASES, USER OPENS DOOR TO ENTER.

**Hardware Group No. 12**

For use on Door #(s):

102

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	PANIC HARDWARE	98-NL		626	VON
1	EA	ELECTRIC STRIKE	6300 FSE		630	VON
1	EA	SURFACE CLOSER	4050 RW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	CREDENTIAL READER	BY DIV 28			B/O
		POWER SUPPLY	BY DIV 28			B/O

CARD IN. USER PRESENTS CREDENTIAL, ELECTRIC STRIKE KEEPER RELEASES, USER OPENS DOOR TO ENTER.

**Hardware Group No. 13**

For use on Door #(s):

139A

Provide each SGL door(s) with the following:











QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80PD RHO EV29 T145		626	SCH
1	EA	SURFACE CLOSER	4050 RW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	SET	SEAL	488S-BK			ZER



**Hardware Group No. 14**

For use on Door #(s):  
 138A









Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
2	EA	FLUSHBOLT	FB458 12"		626	IVE
1	EA	DUST PROOF STRIKE	DP1		626	IVE
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8305 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4050 HW/PA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	SEAL	429A		AL	ZER
1	EA	DOOR SWEEP	39A		AL	ZER

**Hardware Group No. A1**

For use on Door #(s):  
 100 109

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD		628	IVE
1	EA	PANIC HARDWARE	98-NL		626	VON
1	EA	RIM CYLINDER	20-057 EV29 T145		626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE		630	VON
1	EA	OH STOP	100S ADJ		630	GLY
1	EA	SURFACE CLOSER	4040XP EDAW/62G MC		689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA		689	LCN
1	EA	5TH SCREW SUPPORT	4040XP-30		689	LCN
1	SET	PERIMETER SEALS	DOOR MFG STD			B/O
1	EA	THRESHOLD	DOOR MFG STD			B/O
1	EA	CREDENTIAL READER	BY DIV 28			B/O
		POWER SUPPLY	BY DIV 28			B/O

CARD IN. USER PRESENTS CREDENTIAL, ELECTRIC STRIKE KEEPER RELEASES, USER OPENS DOOR TO ENTER.

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Delegated design of exterior and interior, monolithic glazing and insulated glazing units.
- B . Glass glazing.
- C . Insulated glazing units.
- D . Fire-rated glazing.
- E . Mirror glass.

### 1.2 RELATED REQUIREMENTS

- A . 08 11 13 - Hollow Metal Doors and Frames: For assembly requiring components from this section.
- B . 08 14 16 - Flush Wood Doors: For assembly requiring components from this section.

### 1.3 SUBMITTALS

- A . Qualification Data: For installer, fabricator and design engineer.
- B . Early Performance Criteria Design Submittal: Submit design package identifying the following criteria, used to design aluminum framed entrances and storefront systems:
  - 1. Load criteria, including seismic load criteria, wind load criteria.
  - 2. Design Loads, including wind loads at typical locations and corners, corner zone width, glass dead load, and glazing makeup.
  - 3. Anticipated movements, including the following:
    - a. Horizontal Joint Movement:
      - 1) Live load deflection.
      - 2) Thermal expansion.
      - 3) Long-term DL creep.
      - 4) Column shortening.
      - 5) Total Movement.
    - b. Elastic Story Drift.
    - c. Lateral Drift.
    - d. Parallel-to-Wall Deflection.
    - e. Cantilever Deflection of Framing Members.

- C . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Include the following:
  - 1. Provide specific shadowbox calculations to determine if ventilation of the cavity is required
- D . Energy Performance Certificates: Certificates are required for this project including project specific frame types, spacer types and glass types. Project specific reports substantiate U-value, visual light transmission, and solar heat gain values required by the Energy Code for the project.
  - 1. For projects following the Energy Code - Prescriptive Path: Submit NFRC Report with gateway sizes indicating compliance with requirements.
  - 2. For projects following the Energy Code - Performance Path: Submit CMAST bid reports at time of product submittal. Prior to glazed assembly installation, submit NFRC-CMAST label certificates for the designed assemblies (not gateway sizes). Provide finite element computer thermal modeling and calculations per NFRC 100 and NFRC 200, using DOE/LBNL THERM 5.2 and WINDOWS 5.2 software.
- E . Product Data:
  - 1. Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
  - 2. Glazing Compounds & Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements and identify available colors.
- F . Shop Drawings: For any glazing installed with components from this section alone.
  - 1. Submit shop drawings for glazing installed within other systems in accordance with the system submittal requirements.
- G . Sample: Submit two samples in manufacturer's standard size of glass type units, showing coloration and design.
- H . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- I . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- J . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

#### 1.4 QUALITY ASSURANCE

- A . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
- B . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.

- C . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

#### 1.6 WARRANTY

- A . Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- B . Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Glazing and accessories installed as monolithic glazing or insulating glazing units within framing systems and support structures specified elsewhere.

#### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Thermal Performance:

- 1. U-Value:

- a. Prescriptive Energy Code Limits: Based on NFRC 100 gateway size.
  - 1) Fixed Glazing, including frame: U-value 0.45 maximum.
- b. The project is utilizing Total Building Performance approach to compliance with Washington State Energy Code. Prescriptive limits above are provided as benchmarks. Refer to SCHEDULE below for weighted averages based on energy models.
  - 1) U-Value, Maximum: For glass and frames, fixed and operable based on project specific opening sizes, configurations, frame types, spacer types and glass types. Advertised U-values substantiated by NFRC Bid Reports at time of bid.
  - 2) U-Value Maximums are subject to change as the energy model is updated.

- 2. Solar Heat Gain Coefficient (SHGC), Maximum: For the overall glazed assembly vision area and adjacent framing.
- 3. Visible Light Transmission (VLT), Minimum: For the overall glazed assembly vision area and adjacent framing.

- B . By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

- C . Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.

- D . Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C1048.

- E . Thickness: As required for loads indicated.
- F . Deflection no greater than 1/175 of the longest dimension or 1/2 inch whichever is less.

## 2.3 GLASS GLAZING

### A . Float Glass:

1. Performance Criteria:
  - a. By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  - b. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
  - c. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C1048.
  - d. Tinted Types: Performance and features to match basis of design product.
2. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
3. Heat-Strengthened in accordance with ASTM C1048.
4. Fully Tempered in accordance with ASTM C1048.
  - a. Safety Glazing: Comply with 16 CFR 1201 test requirements for Category II..

### B . Typical Exterior Storefront Vision Glazing:

1. Application: Insulated Glazed Envelope System:
2. Performance:
  - a. U-Value, minimum: To be determined.

### C . Insulated Glazing Unit: Total thickness as required by panel size indicated when designed in accordance with performance criteria.

1. Outboard Lite: Float glass.
  - a. Coating: Low-E Coating on the #2 surface: product to be determined.
  - b. Lite Thickness: 6 mm
2. Hermetic Air Space: Argon as required to meet full system U-values.
  - a. Thickness: 12 mm.
3. Inboard Lite: Float glass; tempered as required by local code and design of insulating glazing units.
  - a. Lite Thickness: 6 mm.

### D . Mirror Glass:

1. ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality Q1 (mirror select); silvering, protective coating and physical characteristics complying with ASTM C1503; 6 mm minimum thick.
2. Full wall and 6-foot height starting at 6-inches off floor.
3. Location: Fitness room.

E . Glazing Channel Accessories: As indicated in Drawings.

## 2.4 INSULATED GLAZING UNITS

A . Fabricator:

1. Any of the manufacturers specified for float glass.
2. Any fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified performance, features and warranty.

## 2.5 ACCESSORIES

A . Glazing Channels: Specification is based on CRL Wet Glaze U Channels by CRLaurence Co. Inc.

B . Vertical Glazing Gasket: Specification is based on CRL EZ Glaze Soundstrip by CRLaurence Co. Inc.

1. Features:
  - a. Color: Clear
  - b. Depth: Selected to match glass panels.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

### 3.4 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Fixed louvers.

### 1.2 RELATED REQUIREMENTS

- A . 07 62 00 - Sheet Metal Flashing and Trim.
- B . 07 90 05 - Joint Sealers.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer.
- B . Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C . Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D . Sample: Submit two samples 4 inch x 6 inches in size illustrating finish and color of exterior and interior surfaces.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's performance, materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### 1.6 WARRANTY

- A . Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

1. Panel Finish Criteria are listed AAMA 2605.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A. Factory fabricated and assembled architectural louvers including fixed, operable and acoustic types.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. AMCA Certified in accordance with AMCA 511.
- B. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
- C. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at 850 feet per minute, when tested in accordance with AMCA 500-L.
- D. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
- E. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

### 2.3 FIXED LOUVERS

- A. Glazed in Fixed Louver:
  1. Basis of Design: Model A4097G with glazing frame by Construction Specialties Inc. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
  2. Performance Criteria:
    - a. Free Area: 50 percent, minimum.
    - b. Status Pressure Loss: In accordance with AMCA 500-L.
  3. Features:
    - a. Glazing Frame for integration into aluminum framing systems with typical 1 inch glazing pocket.
    - b. Blades: Drainable.
    - c. Frame: 4 inches deep, channel profile; corner joints mitered and with continuous recessed caulking channel each side.
    - d. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
    - e. Finish: In accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
      - 1) Color: As scheduled below.
- B. Fixed Louver:
  1. Basis of Design: 5 inch deep Storm Resistant Fixed Louver Model RS-5300 by Construction Specialties Inc. Material. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.



2. Performance Criteria:
  - a. Free Area: 50 percent, minimum.
  - b. Status Pressure Loss: In accordance with AMCA 500-L.
3. Features:
  - a. Blades: Drainable.
  - b. Frame: 5 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
  - c. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
  - d. Finish: In accordance with Section 05 05 13 - Shop-Applied Coatings for Metal.
    - 1) Color: As scheduled below.

## 2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Blank-Off Panels:
  1. Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- C . Bird Screen:
  1. Interwoven wire mesh of steel, 14 gage, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
- D . Fasteners and Anchors:
  1. Stainless steel.
- E . Flashings:
  1. Of same material as louver frame, formed to required shape, single length in one piece per location.
- F . Sealant:
  1. Type, as specified in Section 079005.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install perimeter sealant and backing rod in accordance with Section 07 90 05.
- C . Coordinate with installation of mechanical ductwork.
- D . Coordinate with installation of louver actuators.

### 3.4 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Gypsum Sheathing.
- B . Gypsum Board.
- C . Tile Backer Board.

### 1.2 RELATED REQUIREMENTS

- A . 05 40 00 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
- B . 06 10 00 - Rough Carpentry: Building framing and sheathing.
- C . 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
- D . 07 90 05 - Joint Sealers: Acoustic sealant.

### 1.3 SUBMITTALS

- A . Qualification Data: For Installer and design engineer.
- B . Product Data: Provide data on gypsum board, glass mat faced gypsum board, accessories, joint finishing system, and cement board.
- C . Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- D . Test Reports: For all stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

### 1.4 QUALITY ASSURANCE

- A . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Includes Gypsum wallboard finishing, metal trim and accessories, and acoustical sealants and insulation.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Provide completed gypsum board assemblies complying with ASTM C840 and GA-216.
- B . Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
  - 1. Air Pressure Within Shaft: Sustained loads of 7.5 lbf/sq ft with maximum mid-span deflection of L/240.
  - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C . Fire Rated Assemblies: Provide completed assemblies complying with UL listed assemblies indicated and ratings indicated on life safety drawings.
  - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
  - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.
- D . Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

### 2.3 MATERIALS

- A . Gypsum Sheathing:
  - 1. Sizes to minimize joints in place; ends square cut.
    - a. Application: Exterior sheathing, unless otherwise indicated.
    - b. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - c. Glass-Mat-Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
  - 2. Core Type: Type X.
  - 3. Thickness: 5/8 inch.
  - 4. Basis of Design: Glass-Mat-Faced Products: Georgia-Pacific Gypsum; DensGlass Sheathing; CertainTeed Gypsum, Inc.
- B . Impact-Resistant Gypsum Board:
  - 1. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1629/C1629, sizes to minimize joints in place; ends square cut.
    - a. Application: Use as indicated.
    - b. Type X: Thickness 5/8 inch.

- c. Edges: Tapered.
- d. Products:
  - 1) Georgia-Pacific Gypsum; ToughRock FireGuard X Abuse Resistant Gypsum Wallboard.
  - 2) CertainTeed Extreme Impact Resistant Gypsum Panels.
  - 3) National Gypsum; Hi-Impact XP Gypsum Wallboard.

C. Gypsum Board:

- 1. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - a. Application: Use for vertical surfaces, unless otherwise indicated.
  - b. Type X: Thickness 5/8 inch.
    - 1) Edges: Tapered.
    - 2) Products:
      - a) Georgia-Pacific Gypsum; ToughRock, and ToughRock Fireguard.
      - b) CertainTeed Gypsum, Inc.; GlasRoc.
  - c. Type C: Thickness: As indicated.
    - 1) Edges: Tapered.
    - 2) Products:
      - a) ToughRock FireGuard C Gypsum Wallboard.
      - b) CertainTeed Gypsum, Inc.; Type C Fire-Resistant Drywall.

D. Tile Backer Board:

- 1. Glass-Mat-Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
  - a. Standard Type: Thickness 1/2 inch.
  - b. Fire-Resistant Type: Type X core, thickness 5/8 inch.
  - c. Products:
    - 1) Georgia-Pacific Gypsum; DensShield Tile Backer.
- 2. ANSI Cement-Based Board:
  - a. Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - 1) Thickness: 1/2 inch.
    - 2) Products:
      - a) Custom Building Products; Wonderboard.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

- B . Acoustic Sealant:
  - 1. As specified in Section 07 90 05 - Joint Sealers.
- C . Finishing Accessories:
  - 1. ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
    - a. Types: As detailed or required for finished appearance.
    - b. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
- D . Joint Materials:
  - 1. ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
    - a. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
    - b. Typical: Ready-mixed vinyl-based joint compound.
    - c. Exterior Soffits: Chemical hardening type compound.
- E . High Build Drywall Surfer:
  - 1. Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- F . Anchorage to Substrate:
  - 1. Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Comply with ASTM C840 and GA-216. Install to minimize butt end joints, especially in highly visible locations.
- C . Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D . Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

- E . Exterior Soffit Board: Install perpendicular to framing, with staggered end joints over framing members or other solid backing.
- F . Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

### 3.4 INSTALLATION OF TRIM AND ACCESSORIES

- A . Control Joints: Place control joints consistent with lines of building spaces and as indicated.
  - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
  - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B . Corner Beads: Install at external corners, using longest practical lengths.
- C . Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

### 3.5 JOINT TREATMENT

- A . Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B . Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C . Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 5: Walls and ceilings typical.
  - 2. Level 4: Perforated gypsum.
  - 3. Level 4: For flat paint, a light final paint texture, or with lightweight wall covering.
  - 4. Level 3: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 5. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 6. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
  - 7. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
  - 8. Level 0: Surfaces indicated to be finished in later stage of project.
- D . Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E . Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F . Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### 3.6 FIELD OBSERVATION AT "PUNCH"

- A . Finish will be judged from a viewing difference of 4 feet.

- B . Ceilings will be viewed from a standing position.
- C . Finished lighting system or temporary lighting similar to proposed finished lighting should be used for judging the wall.
- D . Eye catching discrepancies and or blemishes, including “fuzzy” wall board surfaces, will be rejected.

### 3.7 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

### 3.8 SCHEDULE

- A . Typical: Gypsum Board, Type X, 5/8 thickness.
- B . Exterior: Gypsum Sheathing,
- C . Locker Rooms & Restrooms: Glass Mat Gypsum board.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Delegated design of non-structural metal framing.
- B . Metal partition, ceiling, and soffit and shaftwall framing.
- C . Blocking and backing panels.

### 1.2 RELATED REQUIREMENTS

- A . 05 40 00 - Cold-Formed Metal Framing: For structural load bearing metal stud framing.
- B . 09 21 16 - Gypsum Board Assemblies: Execution requirements for anchors for attaching work of this section.

### 1.3 SUBMITTALS

- A . Qualification Data: For installer and design engineer.
- B . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C . Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D . Shop Drawings: Indicate extents, special joint or termination conditions, and conditions of interface with other materials.
  - 1. Indicate acoustic details.
  - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

### 1.5 MOCKUP

- A . Mockup Size: Full height, minimum 12 feet long, including corner.
- B . Mockup may remain as part of the Work.

- C. The work of this section may be part of several different mockups. Coordinate with the mockups of other sections.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.

#### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Perform Work in accordance with ASTM C754.
- B. Coordinate the placement of components to be installed within stud framing system.
- C. Suspended Assemblies: Coordinate with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
- D. Design and install framing and furring to limit deflection to the following under point loads of 100 lbs and uniform loads as noted below except where required to withstand greater load (pressurized shafts and stairwells for example).
  - 1. Maximum Deflection of Vertical Assemblies:
    - a. Assemblies spanning single floor: Sustained loads of 5 lbf/sq ft with a maximum mid span deflection of 1:240.
    - b. Assemblies spanning multiple floors: Sustained loads of 7.5 lbf/sq ft with a maximum mid span deflection of 1:240.
  - 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.
  - 3. Maximum Deflection for assemblies under applied plaster finishes (Portland Cement or Gypsum) and ceramic tile is 1:360.
  - 4. Use The SSMA Product Technical Information Book to look up the appropriate stud size, spacing and thickness.
- E. Ceiling and Soffit Framing:
  - 1. Seismic Requirements:
    - a. Classification: Conform to ASTM C635/C635M, Heavy Duty Classification.
    - b. Code Compliance: FBC, American Society of Civil Engineers ASCE 7 Section 13 and CISCA (AC) Guidelines.
- F. Acoustic Attenuation for Interior Partitions : STC's are calculated in accordance with ASTM E413 and based on published tests conducted in accordance with ASTM E90.

1. Provide materials and construction identical to those tested in assembly indicated according to ASTM E90. See Section 09 21 16 for STC requirement.
- G . Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

## 2.3 MATERIALS

- A . Metal partition, ceiling, and soffit and shaftwall framing.
  1. Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and "SSMA Product Technical Information" book for the spacing indicated<>.
    - a. Minimum Framing Component thickness is 20 Gage.
    - b. Studs: C shaped.
    - c. Runners: U shaped, sized to match studs.
    - d. Ceiling Channels: C shaped or T shaped.
    - e. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
    - f. Steel Stud Framing Connectors:
      - 1) Products:
        - a) Simpson Strong Tie, Bridging Connectors; DBC Bridging Connector: [www.strongtie.com](http://www.strongtie.com).
    - g. Single leg Resilient channels.
    - h. "Z's": Used for several different members.
    - i. Shaftwall framing CH and other sections as required for complete framing system.
  2. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  3. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
    - a. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
    - b. Material:
      - 1) Typical: ASTM A653/A653M steel sheet, SS Grade 50, with G40/Z120 hot dipped galvanized coating.
      - 2) Areas Subject to Moisture: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating. Areas include exterior or non-conditioned space, shower rooms, locker rooms or other locations subject to regular wetting or high humidity.
    - c. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems.
  4. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.

5. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.
6. Fasteners: ASTM C1002 self-piercing tapping screws.
7. Anchorage Devices: Power actuated.
  - a. Also acceptable "Danback" flexible wood blocking system from Deitrich.
  - b. See backing schedule on architectural drawings.
8. Anchorage Devices: Power actuated or Drilled expansion bolts.
9. Acoustic Insulation: As specified in Section 09 21 16 - Gypsum Board Assemblies.
10. Acoustic Sealant: As specified in Section 07 90 05.
11. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

B. Blocking and backing panels.

1. Sheet Metal Backing (Blocking): 0.036 inch thick, galvanized. 4 inch minimum width
  - a. See backing schedule on architectural drawings.
2. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
3. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
4. Specifically, provide the following non-structural framing and blocking:
  - a. Cabinets and shelf supports.
  - b. Wall brackets.
  - c. Handrails.
  - d. Grab bars.
  - e. Towel and bath accessories.
  - f. Wall-mounted door stops.
  - g. Chalkboards and marker boards.
  - h. Wall paneling and trim.
  - i. Joints of rigid wall coverings that occur between studs.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.
- C. Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION OF STUD FRAMING

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Comply with requirements of ASTM C754.
- C. Extend partition framing to structure where indicated and to ceiling in other locations.
- D. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- E. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- F. At partitions indicated with an acoustic rating:
  - 1. Provide components and install as required to produce STC ratings as indicated.
  - 2. Place two beads of acoustic sealant (one on either side) between runners and substrate, studs, and adjacent construction.
  - 3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.
  - 4. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- G. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- H. Backing and Blocking: Use steel channels or flat sheets secured to studs minimum 4" wide. Provide blocking for support of all wall hung items and equipment.
  - 1. Use sheet metal backing for reinforcement of 16 gauge minimum.
- I. Install supplementary framing and bracing at openings and terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer.
- J. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement:
  - 1. Where edges of suspended ceilings abut building structure at ceiling perimeters and at penetrations of structural elements.
  - 2. Where partition and wall framing abuts overhead structure.
  - 3. Where studs are installed directly against exterior walls of masonry or concrete, install asphalt felt strips between studs and wall.

### 3.4 CEILING AND SOFFIT FRAMING

- A . Comply with requirements of ASTM C754.
- B . Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- C . Install furring independent of walls, columns, and above-ceiling work.
- D . Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- E . Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- F . Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- G . Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- H . Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- I . Laterally brace suspension system.
  - 1. Sway-brace suspension systems with hangers used for support.

### 3.5 TOLERANCES

- A . Maximum Variation From True Position: 1/8 inch in 10 feet.
- B . Maximum Variation From Plumb: 1/8 inch in 10 feet.
- C . Level ceiling to a tolerance of 1/1200. For tilted ceilings maintain this tolerance as a "flatness" tolerance.

### 3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

### 3.7 SCHEDULE

- A . Interior Assemblies: Finish: G40, Sizes: Profiles indicated, Metal Thickness: As required to meet performance criteria.
- B . Exterior Assemblies: Finish: G90, Sizes: Profiles indicated, Metal Thickness: As required to meet performance criteria.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Tile.
- B . Installation materials.
- C . Installation methods.

### 1.2 RELATED REQUIREMENTS

- A . 07 90 05 - Joint Sealers: For sealants installed with tiling.
- B . 09 21 16 - Gypsum Board Assemblies: For tile backer board installation for tile substrate.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For installer.
- B . Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C . Shop Drawings: Indicate membrane and tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details and related dimensioning as well as plumbing (drains) mechanical and electrical fixtures and lines installed.
- D . Sample: Mount tile and apply grout on two plywood panels, minimum 18 x 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.5 MAINTENANCE MATERIAL

- A . Extra Tile: 10 square feet of each size, color, and surface finish combination.

1.6 QUALITY ASSURANCE

- A . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

1.7 MOCKUP

- A . Construct tile mockup where indicated on the drawings, incorporating all components specified for the location.
  - 1. Minimum size of mockup is indicated on the drawings.
  - 2. Approved mockup may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.9 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work withing a 2 year period after Date of Substantial Completion.
- B . Manufacturer Warranty: Provide five year warranty for tile setting materials failing to resist penetration of water.
  - 1. Exception: Where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Tile assemblies and accessories installed in accordance with Tile Council of North America guidelines on walls, floors, and in showers.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Blending: For tiles with color variations, factory blend and package tile so each package has the same range of colors and quantities of each variation. If factory blending is not available, field blend prior to beginning installation.
- B . Wet Dynamic Coefficient of Friction (DCOF): Not less than 0.42 as tested in accordance with ANSI/NFSI B101.3 Wet DCOF of Common Hard-Surface Floor Materials.

2.3 TILE

- A . Manufacturers:
  - 1. Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.



B . CT-1

1. Florida Tile, NY2LA HDP.
2. Bullnose, P43N9, 3"x24".
3. Color: Chelsea Black.
4. Grout: Laticrete; color to match CT-1.

C . CT-2

1. Florida Tile, NY2LA HDP.
2. Porcelain Tile, 3.75"x12.
3. Color: Chelsea Black.
4. Grout: Laticrete; color to match CT-1.

D . CT-3

1. Daltile, Color Wheel Collection Linear.
2. Glazed Ceramic, 4"x16", Glossy, 50% offset install.
3. Color: Arctic White 0190.
4. Top Trim: S44D9 4"x16" Bullnose, matching color.
5. Outside Corner Trim: S1/212J ½"x12" Jolly, matching color, as required.

2.4 GROUT: LATICRETE 24 NATURAL GRAY .INSTALLATION MATERIALS

A . Non-Ceramic Trim:

1. (MCB-1)
2. Basis of Design: Schluter-Systems: [www.schluter.com](http://www.schluter.com).
  - a. Product: DILEX-AHKA.
  - b. Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.
3. Features:
  - a. Anodized Aluminum cove-shaped profile.
  - b. Finish: Satin Anodized Aluminum.

B . Bond Coat:

1. Manufacturers:
  - a. **Schluter All-Set**; [www.schluter.com](http://www.schluter.com).
2. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
  - a. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
  - b. Products:
    - 1) **Schluter All-Set**; [www.schluter.com](http://www.schluter.com).
  - c. Performance:
    - 1) Dry-Set Cement Mortar for Large and Heavy Tile.

2) Non-Sag Characteristics for Wall Tile Installations.

C. Grout:

1. Manufacturers:
  - a. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: [www.laticrete.com](http://www.laticrete.com).
2. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
  - a. Products:
    - 1) LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: [www.laticrete.com](http://www.laticrete.com).
  - b. Applications: Where indicated.
    - 1) Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

D. Grout Sealer:

1. Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
2. Product:
  - a. AquaMix Sealers' Choice Gold by Custom Building Products.
  - b. Performance:
    - 1) Water-Based Penetrating Sealer – No Sheen Formula.
    - 2) Low VOC Content, below 100 g/L.

2.5 INSTALLATION METHODS

- A. Wall Installation over Gypsum: In accordance with The Tile Council of North America Handbook TCNA (HB):
  1. TCNA Installation Method: W244.
  2. Using waterproof membrane at toilet room walls containing plumbing.
- B. Floor Installation over Concrete: In accordance with The Tile Council of North America Handbook TCNA (HB):
  1. TCNA Installation Method: F113.
- C. Shower Wall Installation over Tile Backer: In accordance with The Tile Council of North America Handbook TCNA (HB):
  1. TCNA Installation Method: B422.
  2. Carry membrane up shower walls to ceiling.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.
- B . Verify Deflection of floor using note "Maximum Allowable Deflection..." under the headline Notes / Definitions in the TCA manual. This limit 1/360 with a 300 lb concentrated load shall be doubled to 1/720 for stone tiles.
- C . Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- D . Large format tiles require very flat floors. Do not install if floors are not the equivalent of a floor flatness of Ff 50 (35 local) and FI 50 (35 local).
- E . Verify that concrete subfloor surfaces are ready for tile installation in accordance with requirements for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
  - 1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours, tested according to ASTM F1869.
  - 2. Alkalinity: pH range of 5 to 9, tested according to ASTM F710.

#### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

#### 3.4 CLEANING

- A . Clean tile and grout surfaces.

#### 3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.
- B . Apply heavy kraft paper as a minimum to prevent surface damage during construction, and remove before final inspection.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Suspended metal grid ceiling system.

### 1.2 RELATED REQUIREMENTS

- A . 07 90 05 - Joint Sealers: Acoustical sealant.
- B . 09 21 16 - Gypsum Board Assemblies: Acoustical insulation.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.
- B . Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, and perimeter molding and suspension/bracing details.
- C . Product Data: Provide data on suspension system components, acoustical units, and perimeter molding/seismic connections.
- D . Samples: Submit two samples 48 x 48 inch in size illustrating material and finish of acoustical units.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

- B . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

#### 1.6 MOCKUP

- A . Locate where directed.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

#### 1.8 WARRANTY

- A . Provide 10 year manufacturer warranty on all acoustical panels for sagging and warping, grid system, rusting, and manufacturer's defects.
- B . Provide 15 year warranty for all products using additional "Humidity and Sag resistance" control systems.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Suspended metal grid ceiling systems with seismic edge clips and manufactured edge trim at changes in plane. Fiberglass and gypsum based acoustical units.

#### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Seismic Requirements:
  - 1. Classification: Conform to ASTM C635/C635M, Heavy Duty Classification.
  - 2. Code Compliance: IBC, American Society of Civil Engineers ASCE 7, and CISCA (AC) Guidelines. Comply with edition dates per local Authorities Having Jurisdiction.
- B . Components: Lock together in a positive manner.
- C . Pull out tension:
  - 1. Cross Tee Connections: Minimum 300 pounds.
  - 2. Main Tee Splices: Minimum 200 pounds.
- D . Seismic Lateral Design: Conform to IBC and ASCE 7 especially requirement for independent support from structure above for light fixture and mechanical services installed into acoustical lay-in panel ceiling systems.
- E . Install to conceal plenum space above acoustical ceiling system and to allow access.
- F . Make provisions for vertical as well as horizontal suspension systems.

#### 2.3 MANUFACTURERS

- A . Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

## 2.4 MATERIALS

- A . (APC-1) Acoustical Units - General: ASTM E1264, Class A.
1. Basis of Design: Ultima High NRC by Armstrong World Industries, Inc.
    - a. Item No.: 1943.
  2. Performance Criteria:
    - a. Light Reflectance: 0.88 percent, determined in accordance with ASTM E1264.
    - b. NRC: 0.75 determined in accordance with ASTM E1264.
    - c. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
    - d. Class A: ASTM E84 surface burning characteristics. Flame Spread Index of 25 or less. Smoke Developed Index of 50 or less (UL labeled).
    - e. ASTM E1264 Classification Type IV, Form 2, Pattern E Fire Class A.
  3. Features:
    - a. Grid: 15/16-inch.
    - b. Size: 2-feet x 7/8-inch.
    - c. Edge: Square Lay-In.
    - d. Surface Color: Blizzard White.
    - e. Suspension System: Prelude XL 15/16-inch.

## 2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Support Channels and Hangers:
1. Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- C . Perimeter Moldings at Changes in Elevation:
1. Same material and finish as grid.
    - a. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid. Basis of Design: Axiom Trim and Transitions by Armstrong Commercial Ceilings.
    - b. At Concealed Grid: Provide concealed molding.
- D . Seismic Suspension Edge Clips:
1. Manufacturer's approved, to meet code required movement without 2 inch wall angles.
- E . Acoustical Sealant For Perimeter Moldings:
- F . Touch-up Paint:
1. Type and color to match acoustical and grid units.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.
- B . Verify that layout of hangers will not interfere with other work.

#### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Suspension system:
  - 1. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
  - 2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
  - 3. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
    - a. See also reflected ceiling plans. Where 50 percent unit cannot be achieved, consult Architect before installation.
  - 4. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
  - 5. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
  - 6. 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.
  - 7. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
  - 8. Do not support components on main runners or cross runners if weight causes excess deflection.
  - 9. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
  - 10. Do not eccentrically load system or induce rotation of runners.
  - 11. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

#### 3.4 TOLERANCES

- A . Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B . Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### 3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

END OF SECTION



## **PART 1 - - GENERAL**

### 1.1 SECTION INCLUDES

- A . Acoustical wood ceiling systems.
- B . Suspension system and connectors.
- C . Accommodation for penetrations of HVAC and electrical items such as lighting and wall outlets.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.
- B . Submit shop drawings prepared by the manufacturer showing all necessary details and dimension requirements field verified.
- C . Samples: Submit 8-inch X 5-inch sample panels of each type of product specified.
- D . Certification: Submit certificate of compliance to specified acoustical and fire performance criteria as stated below
- E . Test results: Submit independent laboratory test results for each product used. components must meet or exceed the specified requirements.
- F . Manufacturer's Approval of installer.
- G . Single Source: All wood ceiling panels shall be purchased from a single supplier.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer & Installer: Firm manufacturing shall have adequate capacity required for projects listed and have successfully completed similar projects for not less than five years.
- B . The Installer shall be approved by the manufacturer as qualified to perform work.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A . Fire-Retardant-Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

- B. Deliver fabricated units and related components to the site for installation in accordance with a reasonable schedule furnished by the contractor. On-site storage shall be such as to assure that all panels and associated materials are protected from damage.
- C. Do not deliver wood materials to project site until building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWI Quality Standards Illustrated.
- D. Store, install and maintain panels only in a secure ambient environment (humidity minimum 35 percent - maximum 55 percent, temperature not to exceed 80° F).

## **PART 2 - - PRODUCTS**

### 2.1 DESCRIPTION

- A. Suspended linear wood ceiling systems with seismic edge clips and manufactured edge trim at changes in plane.

### 2.2 DESIGN REQUIREMENTS

- A. (WD-1) Suspended Wood Ceiling
  1. Basis of Design: Woodworks Grille by Armstrong.
    - a. Item: 7097 Backer Only.
    - b. Item: 1729.
  2. Access Panel(s):
    - a. Provide access panel(s) in location(s) indicated in Drawings.
    - b. Follow Manufacturer's written installation requirements for creating access panels in the field.
  3. Features:
    - a. Grid: Fine fissured 15/16-inch.
    - b. Edge: Square lay-in.
    - c. Finish: Light Cherry.
  4. Ceiling Installations meet the requirements of Section 09 51 00.
  5. Reference Standards: Conform to all governing laws, building codes, and the following performance criteria:
    - a. Fire Performance Characteristics: Provide product with surface-burning characteristics as determined by testing panel components in accordance with ASTM E84 test procedures:
      - 1) ASTM E84; Class "A" or "1". Flame Spread: 25 or less; Smoke Developed: 450 or less.
      - 2) ASTM E84 testing must be performed by an independent testing organization acceptable to authorities having jurisdiction.

- b. Acoustical Performance Characteristics: Provide panels with acoustical absorption characteristics as indicated below, which have been determined by testing fully assembled production material (using 96-112kg/cu. m. (6 - 7lb/cu. ft.) density fiber glass insulation) in accordance with ASTM C423 (Type A mounting method as defined by ASTM E795) by a testing organization acceptable to authorities having jurisdiction. Approved testing organization must be independent of the manufacturer.

### 2.3 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - - EXECUTION**

### 3.1 PREPARATION

- A. Examine substrates and structural framing to which ceiling system attaches or abuts, with installer present, for compliance with requirements of this or other sections that affect installation and support of ceiling system.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Provide for shimming and adjustment to maintain consistent alignment of joints and finished panel faces.
- C. Coordinate location of framing and hangers with other work. Where components prevent regular spacing of framing or hangers, reinforce system to span the extra distance.
- D. Hang system independent of walls, columns, ducts, pipes, and conduit.

### 3.3 TOLERANCES

- A. Variation from Flat and Level Surface: 0.125 inch in 10 feet.

### 3.4 ADJUSTMENT AND REPLACEMENT

- A. The Owner shall inspect the installation and product on completion. The manufacturer shall provide repair or replace components not conforming to requirements.
- B. Installation labor for removal and replacement of product improperly installed and not conforming to specified installation instructions and shown on plans shall be the responsibility of the installing Contractor.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Resilient base.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For installer.
- B . Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C . Shop Drawings: Indicate seaming plan.
- D . Flooring Sample: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each resilient flooring product specified; heat weld rod samples for selection.
- E . Base and Accessory Samples: Submit manufacturer's complete set of color samples for initial selection.
- F . Certificate: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

### 1.4 MAINTENANCE MATERIAL

- A . Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Wall Base: 20 linear feet of each type and color.

1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum 2 years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A . Provide minimum Manufacturers Limited 5 year commercial warranty for manufacturing defects.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Resilient tile flooring and resilient base for transition to other flooring types.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.

2.3 RESILIENT BASE

- A . (RES-1) Resilient Base: ASTM F1861, top set Style A straight, and as follows:
  1. Basis of Design: Pinnacle Rubber Base by ROPPE.
  2. Material: TS - Thermoset Vulcanized Rubber
  3. Color: 100 Black.
  4. Styles: 6-inch standard toe base.
  5. Matching inside/outside corners as required.
  6. Length: Roll (4 foot sections are not acceptable except as maintenance stock).

2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Filler for Coved Base:
  1. Plastic.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

A . Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

A . General:

1. Install all materials in accordance with manufacturer's instructions based on conditions present.

#### 3.4 CLEANING

A . Remove excess adhesive from floor, base, and wall surfaces without damage.

B . Initial cleaning and finishing is the responsibility of the contractor.

1. Follow manufacturer's recommendations for initial cleaning and finishing procedures.
2. Not all types of flooring require finishing.

#### 3.5 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Sheet athletic flooring.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer and installer.
- B . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C . Shop Drawings: Indicate control joints and expansion joints, and detailing at projections and penetrations.
- D . Sample: Of each type and finish of flooring.
- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommended schedule of maintenance.

### 1.4 MAINTENANCE MATERIAL

- A . Provide extra stock materials from same production run, for use in facility operations and maintenance for each color, surface texture and format of flooring.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Resilient sheet floor products intended for a fitness environment.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Critical Radiant Flux: Less than 0.45 tested in accordance with ASTM E648.
- B . Smoke Development: Less than 450 tested in accordance with ASTM E662.
- C . Antimicrobial: 99.99 percent reduction tested in accordance with ASTM E2180.
- D . ADA compliant as per ASTM D2047.

2.3 MANUFACTURERS

- A . Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

2.4 SHEET ATHLETIC FLOORING

- A . (RF-1) Rubber Athletic Flooring
  - 1. Basis of Design: Roppe, Tuflex Spartus Multipurpose Sports Flooring.
    - a. Square edge tiles.
    - b. Color: 977 Natural.

2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Rubber Transition:
  - 1. Basis if Design: Mannington Commercial.
  - 2. Substitutions for products by manufacturers other than those listed: See Section 01 60 00-Product Requirements.
  - 3. Color: Match flooring.



C . Manufacturer's accessories required by the project:

1. Adhesives:

- a. As recommended by manufacture in printed adhesive guidelines based on surface impacts and dynamic loads.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B . Verify that wall surfaces are smooth and flat within the tolerances specified, are dust-free, and are ready to receive resilient base.
- C . Cementitious Subfloor Surfaces: Verify that substrates meet moisture, internal relative humidity and alkalinity requirements of flooring and adhesive manufacturers.
1. Obtain instructions if test results are not within limits recommended by flooring manufacturer and adhesive manufacturer.
- D . Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Sheet Sport Flooring: Install as glue down.
- C . Install line marking in accordance with manufacturer's instructions after all flooring installation has been approved.

3.4 CLEANING

- A . Wait at least a minimum of 72 hours after the resilient athletic flooring has been completely installed before performing initial maintenance.
- B . Performing initial maintenance as recommended by manufacturer.

3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Interior paint systems.
- B . Exterior paint systems.

### 1.2 RELATED REQUIREMENTS

- A . 05 05 13 - Shop-Applied Coatings for Metal: For factory applied finishes.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- B . Sample: Submit three paper chip samples, 8.5 x 11 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of paint and coating products used in the work of this section with minimum ten years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

A . Surface preparation and field application of paints, stains, varnishes, and other coatings.

### 2.2 MANUFACTURERS

A . Provide all paint and coating products used in any individual system from the same manufacturer; unless noted otherwise below.

B . Paints:

1. S-W: Sherwin-Williams Co.: [www.sherwin-williams.com](http://www.sherwin-williams.com).

C . Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.

### 2.3 MATERIALS

A . Interior Painting Schedule

1. Steel Substrates: Hollow metal doors and frames and steel surfaces within 10 feet above finished floor. All access doors in walls and ceilings.

a. High Performance Architectural Latex: MPI INT 5.1RR Gloss Level 5.

1) Prime Coat: Alkyd Primer.

a) Intermediate Coat: HIPAC Latex.

b) Topcoat: HIPAC Latex.

2. Concrete Masonry Units:

a. Epoxy for wet environments: MPI INT 4.2G.

1) Prime Coat: Epoxy Block Filler.

2) Intermediate Coat: Epoxy.

3) Topcoat: Epoxy.

3. Gypsum Board Substrates: Walls and Partitions MPI Gloss Level 3.

a. High Performance Architectural Latex: MPI INT 9.2B.

1) Prime Coat: Interior latex primer/sealer.

2) Intermediate Coat: HIPAC Latex.

3) Topcoat: HIPAC Latex.

4. Gypsum Board Substrates: Ceilings Non-damp Areas MPI Gloss Level 1.

a. Latex: MPI INT 9.2A.

1) Prime Coat: Interior latex primer/sealer.

2) Intermediate Coat: Latex.

3) Topcoat: Latex.

5. Gypsum Board Substrates: Walls, Partitions, and Ceilings of Restrooms, Laundry Room, Janitor Room.

a. Epoxy, waterborne, MPI INT 9.2F – Toilet Rooms and Janitor Rooms.

- 1) Prime Coat: Interior latex primer/sealer.
  - 2) Intermediate Coat: Waterborne epoxy low/VOC.
  - 3) Topcoat: Waterborne epoxy low/VOC.
- B. Exterior paint systems:
1. Steel Substrates:
    - a. Alkyd System: MPI EXT 5.1D.
      - 1) Prime Coat: alkyd anticorrosive metal primer.
      - 2) Intermediate Coat: Exterior alkyd enamel.
      - 3) Topcoat: Exterior alkyd enamel.
  2. Galvanized-Metal Substrates: Gloss Level 5.
    - a. Alkyd System:
      - 1) Prime Coat: MPI # 134.
      - 2) Intermediate Coat: MPI # 94.
      - 3) Topcoat: MPI #94.
  3. Concrete Substrates, Nontraffic Surfaces:
    - 4) Latex System: MPI INT 3.1A.
    - 5) One coat primer/sealer: Primer, exterior, matching topcoat.
  4. Concrete Substrates, Traffic Surfaces:
    - 6) Latex Floor Paint System: MPI EXT 3.2A.
    - 7) One coat primer/sealer: Primer, exterior, matching topcoat.
  5. Wood Substrates:
    - 8) Latex System: MPI EXT 6.3L.
    - 9) One coat primer/sealer: Primer, latex for exterior wood, MPI#6.

## 2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

### 3.4 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

### 3.5 SCHEDULE

#### A . Interior Coating Systems:

1. (P-1) Sherwin Williams Pure White SW 7005.
2. (P-2) Sherwin Williams Anew Gray SW 7030.
3. (P-3) Sherwin Williams Granite Peak SW6250.
4. (P-4) Sherwin Williams Peppercorn SW7674.

#### B . Exterior Coating Systems:

1. Typical Steel:
  - a. System: Zinc Rich Epoxy Urethane.
  - b. Sheen: Semi-Gloss.
2. Steel Ladders and Handrails:
  - a. System: Zinc Rich Epoxy Urethane.
  - b. Color: As indicated by location.
3. Typical Aluminum:
  - a. System: Epoxy Urethane
  - b. Sheen: Semi-Gloss.
  - c. Color: As indicated by location.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Writing marker boards.
- B . Tack boards.

### 1.2 RELATED REQUIREMENTS

- A . 01 60 00 - Product Requirements: For substitution and additional product requirements.
- B . 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

### 1.3 SUBMITTALS

- A . Product Data: Provide product criteria, characteristics, accessories, jointing and methods, and termination details for visual display surfaces and accessories.
- B . Sample: Each visual display surface.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's hardware, operation, materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.
- B . As required by SMACNA Guideline Chapter 3 and Section 01 35 15 - LEED Certification Procedures.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Visual display surfaces including writing marker boards and tack boards.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.3 MATERIALS

### A . Writing Marker Boards:

1. Basis of Design Product: Claridge Products and Equipment, Inc., Tel. (870) 743-2200. Claridge Products are specified for type, quality and construction required.
  - a. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
2. Features:
  - a. Material: Porcelain steel dry erase board, magnetic.
    - 1) Size: App Bay: 4-feet x 6-feet.
    - 2) Dining: 4-feet x 6-feet or 4-feet x 8-feet.
    - 3) Fitness: TBD.
    - 4) FFWA: TBD.
    - 5) Captain's Office: TBD.
    - 6) BC Office: TBD.
  - b. Mounting: Stationary systems with standard frames.
  - c. Accessories: Full length marker tray.
  - d. Tack strip inserts in map rails: Granulated cork and linseed with burlap backing.
  - e. Color: white; porcelain.

### B . Tack Boards:

1. Basis of Design Product: Claridge Products and Equipment, Inc., Tel. (870) 743-2200. Claridge Products are specified for type, quality and construction required.
  - a. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
2. Size: 4-feet x 4-feet.
3. Mounting: Direct mounting to walls as recommended by the manufacturer.
4. Color: Tan 1100.
5. Frame Finish: Satin anodized aluminum.

## 2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work, including location of blocking.
- B . Verify products have been stored, and will be installed, in accordance with project's Construction Indoor Air Quality Management Plan specified in Section 01 35 15 - LEED Certification Procedures.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install components plumb, level, square, and in proper alignment with drawings.

### 3.4 ADJUSTING

- A . Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

### 3.5 CLEANING

- A . Dispose of all waste material in accordance with Section 01 74 19 - Construction Waste Management and Disposal and project's Waste Management Plan.

### 3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Delegated design of signage and supports.
- B . Dimensional character signs.
- C . Illuminated dimensional characters.
- D . Panel Signs.
- E . Illuminated panel signs.
- F . Applied Decal Signs.
- G . Dedication Plaque.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For fabricator and design engineer.
- B . Delegated-Design Submittal: For assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C . Product Data: Provide product criteria, characteristics, accessories, jointing and attachment methods.
- D . Shop Drawings:
  - 1. Show sign mounting heights, locations of supplementary supports, and accessories.
  - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
  - 3. Wiring Diagrams: Power, signal, and control wiring.
- E . Sample: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
  - 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
  - 2. Aluminum: For each form, finish, and color, on 6 inch long sections of extrusions and squares of sheet at least 4 by 4 inches.

3. Acrylic Sheet: 8 by 10 inches for each color required.
4. Polycarbonate Sheet: 8 by 10 inches for each color required.
5. Panel Signs: Not less than 12 inches square for each type.
6. Accessories: One of each, for each type.

F . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.

G . Maintenance Data: For user's operation and maintenance of system including:

1. Methods for maintaining system's materials and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
3. Include manufacturers' brochures and parts lists describing the actual materials installed.

H . Closeout Submittals:

#### 1.4 MAINTENANCE MATERIAL

A . Spare parts, extra stock, tools.

#### 1.5 QUALITY ASSURANCE

A . Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

B . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.

C . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

D . Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

#### 1.6 MOCKUP

A . Fabricate sign type representing finished work including material, color, finishes, and attachment method.

B . Locate where directed.

C . Mockup may remain as part of the Work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Signage as required by code and to facilitate wayfinding.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Tactile and Braille Characters: Text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Produce precisely formed characters with square-cut edges free from burrs and cut marks. Text shall be accompanied by Grade 2 Braille. Braille dots with domed or rounded shape produced using Raster Method.
  - 1. Raised-Copy Thickness: Not less than 0.7 mm and not more than 3 mm.
- B . Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### 2.3 MATERIALS

- A . Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- B . Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- C . Steel Sheet: Uncoated, cold-rolled, ASTM A1008/A1008M, commercial steel, Type B, exposed.
- D . Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- E . Steel Members Fabricated from Plate or Bar Stock: ASTM A529/A529M or ASTM A572/A572M, 42,000-psi (290-MPa) minimum yield strength.
- F . Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- G . Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
  - 1. Impact Resistance: 16 ft-lb/in. per ASTM D256, Method A.
  - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D638.
  - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D790.
  - 4. Heat Deflection: 265 degrees F at 264 lbf/sq. in. per ASTM D648.
  - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- H . Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

1. Opaque Vinyl: Basis of Design: 3M Scotchcal Electro Cut Graphic Film, or a comparable product by the following:
  - a. Gerber Scientific Products.
2. Translucent Vinyl: Basis of Design: 3M Scotchcal Electro Cut Graphic Film, Dusted Crystal Translucent Vinyl, or a comparable product by the following:
  - a. Gerber Scientific Products.
3. Printed Vinyl Sheet: Digitally printed vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing. Apply UV and water resistant coating to face of sheet. Apply sheet to panels indicated.

## 2.4 FINISHES

- A. Aluminum Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.
- B. Stainless Steel: No. 4 finish.
- C. Painted Finishes: Specification is based on products listed by Matthews Paint.
  1. Comparable products by one of the following are also acceptable. See Section 01 60 00 - Product Requirements for submittal requirements.
    - a. Akzo Nobel.
  2. Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
  3. Steel and Galvanized Steel:
    - a. Primer: 274 Series Epoxy Primer, color as required for topcoat color indicated, 1.5 - 2.0 mils DFT.
    - b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.
  4. Aluminum:
    - a. Primer: 274 Series Epoxy Primer, color as required for topcoat color indicated, 1.5 - 2.0 mils DFT.
    - b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.
  5. Acrylic, Polycarbonate:
    - a. Primer: 74777SP/01 Tie Bond 0.4 - 0.6 mils DFT.
    - b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheet unless indicated otherwise.
  6. Clear Coat:
    - a. 281228SP/01, VOC Satin Clear, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.

## 2.5 FABRICATION

### A . Dimensional character signs:

1. Fabricated Channel Characters: Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories.
2. Provide manufacturer's hardware for projection mounting of channel characters at distance from wall surface indicated.
3. Signage material, color and finish as Scheduled.

### B . Panel Signs:

1. Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner signs.
2. Edge Condition: Square.
3. Corner Condition: Square.
4. Mounting: Unframed, as indicated.
  - a. Wall or Projection mounted with concealed attachment.
  - b. Manufacturer's standard anchors for substrates encountered.
5. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

### C . Applied Decal Signs:

1. Applied Vinyl Characters: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing. Apply copy to surfaces indicated.

### D . Dedication Plaque:

1. Custom.

## 2.6 ACCESSORIES

### A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

### B . Manufacturer's optional accessories required by the project:

1. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
2. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.
3. Cable: Fabricate cable and fittings for cable mounted signs from stainless steel cable to suit panel sign construction and mounting conditions indicated.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

A . Verify existing conditions meet the manufacturer's requirements before starting work.

#### 3.2 PREPARATION

A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

#### 3.3 INSTALLATION

A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

#### 3.4 ADJUSTING

A . Adjust and lubricate hardware for proper operation.

#### 3.5 PROTECTION

A . Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

#### 3.6 SCHEDULE

A . Building Identification Sign: Dimensional character sign; Stainless Steel, Thickness: As required for size of letters indicated; Finish: #4 Satin, Size as indicated; mounting: standoffs.

B . Building Address Sign: Polycarbonate, dimensional letters.

C . Room and Door Identification Signs: In compliance with Local Code.

D . Parking Signs: Provided by Civil.

E . Directional Bicycle Parking Sign: Applied Vinyl on Glass.

F . Alarmed Exit Sign: Provided by MEP.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Exterior traffic control signage.
  - 2. Sign posts.
- B. Related Sections include the following:
  - 1. Division 01 Sections.
  - 2. Division 32 Section "Concrete Paving."

### 1.2 DEFINITIONS

- A. MUTCD - Manual of Uniform Traffic Control Devices: Current Edition.
- B. ITD - Idaho Transportation Department.

### 1.3 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. Product Data: For each type of product indicated.
- C. Shop drawings: Show fabrication and installation details for signs.
- D. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
- E. Provide message list, typestyles, graphic elements and layout for each sign.
- F. Samples: For each sign type and for each color and texture required.
- G. Operations and Maintenance Data: Submit manufacturer's written Operations and Maintenance data for all equipment and accessories.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with ITD and City of Twin Falls Standards for all signage within the public street right of way.
- B. Regulatory Requirements: Comply with ADA Standards for Accessible Design and MUTCD Standards, current edition

### 1.5 WARRANTY

- A. Contractor shall warrant work as provided by the General and Supplementary Conditions and Division 01 Specifications.

## **PART 2 - PRODUCTS**

### 2.1 GENERAL

- A. Substitutions or equivalent products shall be in accordance with Division 01 Specifications.

### 2.2 MATERIALS

- A. Material shall be Aluminum Sheet and Plate conforming to ASTM B209, alloy 6061-T6 or 5052-H36 or H38. Thicknesses shall be 0.063 inches for signs up to 20 inches wide, 0.080 inches for signs 21 to 36 inches wide, and 0.125 inches for signs over 36 inches in width.
- B. Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
- C. Minimum Maintained Retro-reflectivity Levels shall be in accordance with the minimum requirements of the MUTCD for the type of sign.
- D. Sign Posts:
  - 1. Sign posts shall be perforated 1.75 inch square telespar, unless otherwise noted. All posts shall be embedded into a concrete footing as detailed on the Drawings.
  - 2. Signs and posts shall be assembled with 5/16-inch by 3-1/4 inch galvanized machine screws and 1 inch O.D. nylon washers, locknuts with nylon inserts, two screws per sign.
  - 3. Galvanized steel sign post sockets shall be provided which fit the sign post profile and permit replacement of damaged sign posts.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify that the finish grade level has been determined for signage location prior to installation.

### 3.2 INSTALLATION

- A. Traffic sign post sockets shall have 24-inch embedded below the finish site grade.
  - 1. Sign post sockets shall be cast into Portland cement concrete, the surface finished to form a 12 inch diameter cap that directs water away from the post, post sockets installed in Portland cement concrete paving areas shall be installed with similar detail created during concrete placement and finishing.
- B. Install sign posts plumb, signs level. Make corrections if required at direction of Owner's Representative.
- C. Installation height of signage shall be per MUTCD or agency having jurisdiction.
- D. Signage mounted on chain link fence fabric shall be securely fastened at top and bottom.
- E. Signage installed in the street right of way shall be installed per the agency having jurisdiction.



3.3 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4-inch.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Corner guards.
- B . Fiber reinforced plastic sheet.

### 1.2 SUBMITTALS

- A . Product Data: Provide product criteria, characteristics, accessories, jointing and methods, and termination details for curtains, track and accessories.
- B . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- C . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's hardware, operation, materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

### 1.3 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B . Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### 1.5 WARRANTY

- A . Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Surface applied wall protection including corner guards.

## 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.3 MATERIALS

- A . Corner guards.
  - 1. Basis of Design: InPro or approved equal.
  - 2. All exposed outside GWB corners and wall ends.
  - 3. Material: Stainless steel.
  - 4. Wing: 2-inches.
  - 5. Gauge: Standard 430 16 gauge.
  - 6. Height: 4-feet.
- B . Sheet Wall Protection.
  - 1. (FRP-1) Fiber Reinforced Plastic Sheet:
    - a. Basis of Design: Palladium Rigid Vinyl Sheet by Inpro.
      - 1) Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.
    - b. Length: Standard 8-foot.
    - c. Thickness: Standard.
    - d. Trims: matching vinyl outside, inside corners, top cap and vertical divider bar as required.
    - e. Color: Monsoon 0378

## 2.4 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work, including location of blocking.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install components plumb, level, square, and in proper alignment with drawings.

3.4 ADJUSTING

- A . Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

3.5 CLEANING

- A . At completion of the installation, clean surfaces in maintenance instructions.

3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Toilet Room Accessories.
- B . Janitorial Room Accessories.

### 1.2 SUBMITTALS

- A . Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- B . Sample: Submit 1 sample of each accessory, illustrating color and finish.
- C . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.3 MAINTENANCE MATERIAL

- A . Keys: Provide 3 keys for accessories to Owner; master key all lockable accessories.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Accessories to be installed in toilet rooms.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Comply with ANSI/ICC A117.1, Americans with Disabilities Act (ADA Standards).

- B. Grab bars, shower seats, and dressing room benches shall be designed to resist a single concentrated load of 250 pounds applied in any direction, at any point on the grab bar or seat so as to produce the maximum loading effects, in accordance with ICC (IBC)-2018 Section 1607.8.2.
- C. Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

## 2.3 MANUFACTURERS

- A. Substitutions for products by manufacturers other than those listed below: See Section 01 60 00 - Product Requirements.

## 2.4 MATERIALS

- A. Stainless Steel Sheet:
  - 1. ASTM A666, Type 304.
- B. Stainless Steel Tubing:
  - 1. ASTM A269/A269M, Type 304 or 316.
- C. Back paint, in accordance with Section 09 90 00 - Painting and Coating, where contact is made with building finishes to prevent electrolysis.
- D. Fasteners, Screws, and Bolts:
  - 1. Hot dip galvanized, tamper-proof, security type.
- E. Expansion Shields:
  - 1. Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

## 2.5 ACCESSORIES

- A. Toilet Room Accessories:
  - 1. Mirrors:
    - a. Basis of Design: Bobrick B-290 Series.
    - b. 24-inches x 36-inches.
  - 2. Grab bars:
    - a. Basis of Design: Bobrick 819440-819441 Series.
    - b. Standard grab bars at each ADA restroom
    - c. Sizes:
      - 1) 42" horizontal
      - 2) 18" vertical
      - 3) 36" horizontal
    - d. Location: Public Restroom 101 and ADA Restroom 125.
  - 3. Coat and Clothing Hooks:
    - a. Basis of Design: Bobrick B-233 Series.

- b. Height:
  - 1) Regular height = 60-66" AFF
  - 2) ADA height = 48" max AFF
- c. Locations:
  - 1) Include a coat hook on back of each restroom door, centered for single, EQ spacing where double.
  - 2) Include second coat hook at ADA height in ADA restrooms, including lobby.
- 4. Towel Shelf:
  - a. Basis of Design: Bobrick B676 Series.
  - b. Locations: Restrooms 121, 124, 125
- 5. Shower Curtain:
  - a. Basis of Design: Bobrick B-207 Series.
  - b. Locations:
    - 1) At restrooms:
      - a) 107: 3-feet 0-inches.
      - b) 121: 3-feet 0-inches.
      - c) 124: 3-feet 0-inches.
      - d) 125: 3-feet 2-inches.
    - 2) Decon: 4-feet 0-inches.
- 6. Baby Changing Station:
  - a. Basis of Design: Koala Bear KB110-SSWM.
  - b. Location: Public Restrom.

B . Janitorial Room Accessories:

- 1. Mop Rack:
  - a. Manufacturer: Wall Rack Organizer by ReadyRack.
  - b. Dimensions: 25.5-inches x 74.5-inches x 1.25-inches.
  - c. Mount: Wall mounted.
  - d. Material: Heavy-duty powder coated steel.

2.6 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Install plumb and level, securely and rigidly anchored to substrate.
- C . Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

### 3.4 TOLERANCES

- A . Maximum Variation From True Position: 1/4 inch.
- B . Maximum Variation From Plumb: 1/8 inch.

### 3.5 ADJUSTING

- A . Adjust and lubricate hardware for proper operation.

### 3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Fire extinguishers.
- B . Fire extinguisher cabinets.
- C . Defibrillator cabinet.

### 1.2 RELATED REQUIREMENTS

- A . 09 21 16 - Gypsum Board Assemblies: Roughed-in wall openings and blocking.

### 1.3 SUBMITTALS

- A . Qualification Data: For manufacturer.
- B . Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- C . Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.
- D . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- E . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Test, refill or recharge schedules and re-certification requirements.
  - 2. Methods for maintaining system's materials and finishes.
  - 3. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Fire extinguishers, fire rated and non-rated cabinets, defibrillator cabinet; surface or recess mounted with accessories for proper use.

## 2.2 PERFORMANCE AND DESIGN CRITERIA

A . Portable fire extinguishers shall be selected and installed in accordance with this section and NFPA 10.

1. 2012 IBC.906.2.

## 2.3 MATERIALS

A . Fire Extinguishers:

1. Multi-Purpose Dry Chemical Extinguisher:

- a. Basis of Cost: Specification is based on MP Series by Larsen's Manufacturing Co.
  - 1) Comparable products by one of the following are also acceptable. See Section 01 60 00 - Product Requirements for submittal requirements.
    - a) JL Industries, Inc: [www.jlindustries.com](http://www.jlindustries.com).
    - b) Ansul, Inc: [www.ansul.com](http://www.ansul.com).
  - 2) Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
- b. Performance Criteria:
  - 1) Complying with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 2) Labeled by UL for the purpose specified and indicated.
  - 3) Class: A:B:C.
  - 4) UL Rating: 4A-80B:C.
  - 5) Extinguisher Model: Larsen's #MP10.
  - 6) Size: 10 pound.
- c. Features:
  - 1) Finish: Baked polyester powder coat.
  - 2) Color: Red.
  - 3) Mount: Cabinet and ring mounted.

B . Fire extinguisher cabinets:

1. Surface Mounted Cabinets:

- a. Basis of Cost: Specification is based on Ridge Series Cabinet by Nystrom.
  - 1) Comparable products by one of the following are also acceptable. See Section 01 60 00 - Product Requirements for submittal requirements.
    - a) Larsen's Manufacturing Co.
    - b) JL Industries, Inc: [www.jlindustries.com](http://www.jlindustries.com).
    - c) Ansul, Inc: [www.ansul.com](http://www.ansul.com).
  - 2) Substitutions for products by manufacturers other than those listed above: See Section 01 60 00 - Product Requirements.
- b. Performance Criteria:
  - 1) Sized to fit specified fire extinguisher.

c. Features:

- 1) Door and Trim Material: Cold steel sheet with recoat able white polyester finish.
- 2) Door Style: Convex, clear plastic bubble window.
- 3) Trim Style: Flat with square corners.
- 4) Glazing: Clear Acrylic.
- 5) Finish of Cabinet Exterior Trim and Door: White enamel

C. Defibrillator Cabinet:

1. Product: AED Superstore: [www.aedsuperstore.com](http://www.aedsuperstore.com).
2. Model: Standard Size AED Wall Cabinet.
3. Mount: Fully-Recessed.
4. Fully-Recessed Mount: 14.625-inches H x 16-inches W x 8.375-inches D.
5. Color: White.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Manufacturer's accessories required by the project:
1. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

3.6 SCHEDULE

- A . (FEC-1): Typical: Recess Mounted Cabinet; with Multi-Purpose Dry Chemical Extinguisher, Type: A:B:C, Capacity: 10 pound.
- B . (FEC-2): Garage: Surface Mounted Cabinet; with Multi-Purpose Dry Chemical Extinguisher, Type: A:B:C, Capacity: 10 pound.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Gear racks.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Product Data: Provide data on locker types, sizes, and accessories.
- B . Shop Drawings: Indicate locker plan layout, numbering plan.
- C . Samples: Submit two samples 3 x 6 inches in size, of each color scheduled; applied to specified substrate.
- D . Manufacturer's Installation Instructions: Indicate component installation assembly.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A . Protect locker finish and adjacent surfaces from damage.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Metal gear racks.

### 2.2 PERFORMANCE AND DESIGN CRITERIA

- A . Code required criteria.
  - 1. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

### 2.3 MANUFACTURERS

- A . Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

### 2.4 GEAR RACKS:

- A . Basis of Design: GearGrid Wall Mount Lockers.

1. Material:
  - a. Size: 24-inches x 30-inches.
  - b. Frame: Heavy-duty 1- $\frac{1}{4}$ " steel tubing.
  - c. Side & Back Grids: High-strength  $\frac{1}{4}$ " wire, 3" x 3" square grid pattern.
  - d. Shelves/Hooks: Two shelves constructed of high-strength  $\frac{1}{4}$ " wire, and three apparel hooks per locker opening.
  - e. Mounting Brackets: 11-gauge steel wall mount brackets.
  - f. Finish: Super Durable TGIC powder coat.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A . Verify that prepared bases are in correct position and configuration.
- B . Verify bases and embedded anchors are properly sized.

#### 3.2 INSTALLATION

- A . Install in accordance with manufacturer's instructions.
- B . Install lockers plumb and square.
- C . Place and secure on prepared base.
- D . Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- E . Bolt adjoining locker units together to provide rigid installation.
- F . Install end panels and filler panels.
- G . Install accessories.
- H . Replace components that do not operate smoothly.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Shelf standards, brackets, and accessories.
- B . Shelves.

### 1.2 RELATED REQUIREMENTS

- A . 01 30 00 - Administrative Requirements: For additional requirements of preinstallation meeting.
- B . 01 60 00 - Product Requirements: For substitution and additional product requirements.
- C . 06 41 00 - Architectural Wood Casework: For additional rod and shelving types.
- D . 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards.

### 1.3 SUBMITTALS

- A . See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B . Product Data: Manufacturer's data sheets on each product to be used.
- C . Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D . Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Brackets: Ten of each size of standard straight bracket.

### 1.4 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A . Store products in manufacturer's unopened packaging until ready for installation.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Wall-mounted 16" deep plastic coated wire shelving with integral hanging rod. Include coordinating corner shelves, brackets, supports, and hardware. Provide where indicated in architectural drawings.

## 2.2 MANUFACTURERS

- A . Shelf Standards and Brackets:
  - 1. Basis of Cost: ClosetMaid or approved equal.
  - 2. Substitutions: See Section 01 6000 - Product Requirements.

## 2.3 MATERIALS

- A . Wall-mounted 16" deep plastic coated wire shelving with integral hanging rod.
  - 1. Corner shelves, brackets, supports and hardware: Provide where indicated in architectural drawings.
- B . Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Do not begin installation until substrates have been properly prepared.
- B . If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A . Clean surfaces thoroughly prior to installation.
- B . Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 INSTALLATION

- A . Install in accordance with manufacturer's instructions.
- B . Mount standards to solid backing capable of supporting intended loads.
- C . Install brackets, shelving, and accessories.

### 3.4 PROTECTION

- A . Protect installed products until completion of project.
- B . Touch up, repair or replace damaged products before Substantial Completion.

### 3.5 CLEANING

- A . Dispose of all waste material in accordance with Section 01 7419 - Construction Waste Management and Disposal and project's Waste Management Plan.

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Knox Box.

### 1.2 SUBMITTALS

- A . Product Data: Manufacturer's printed product literature for each type of specialty, indicating colors, locations, overall dimensions.
- B . Samples: Submit sample of finish options for verification.
- C . Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- D . Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

## **PART 2 - PRODUCTS**

### 2.1 DESCRIPTION

- A . Exterior Specialties: Miscellaneous specialties on building exterior.

### 2.2 KNOX BOX

- A . High Security Industrial/Government Key Vault.
- B . Basis of Design: KnoxVault 4400 Series Single Lock Model by Knox Company.
- C . Finish: Dark Bronze.
- D . Options:
  - 1. Aluminization.
  - 2. Recessed Mounting Kit.
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify that substrate surfaces are ready to receive work.

### 3.2 INSTALLATION

- A . Install in accordance with manufacturer's instructions.
- B . Install neatly, with horizontal edges level.
- C . Protect from damage until Substantial Completion; repair or replace damage items.

### 3.3 SCHEDULE

- A . Knox Box: As indicated on Drawings.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Decontamination washer.
- B . Extractor.
- C . Gear dryer.
- D . Refrigerator.
- E . Gas rangetop.
- F . Wall oven.
- G . Microwaves.

### 1.2 RELATED REQUIREMENTS

- A . 01 60 00 - Product Requirements: For substitution and additional product requirements.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Owner Coordination Meeting: Convene prior to starting design and layout work of this section.
  - 1. Coordinate with Owner's Roof Access and Window Washing and Building Maintenance Procedures to interface with the work of this section.
  - 2. Portions of the Fall arrest and Fall Restraint system may be utilized as part of the window washing or building maintenance system. Coordinate design to minimize duplication of anchor points and other hardware and maximize Owner's use of the roof area for safe maintenance.

### 1.4 SUBMITTALS

- A . Qualification Data: For manufacturer, installer, and design engineer.
- B . Delegated-Design Submittal: For assemblies 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. Include details transferring load of anchors to primary structure.
- C . Product Data: Provide product criteria, characteristics, accessories, performance data, and limitations.
- D . Shop Drawings: Indicate required flashings and sealing at membrane penetrations.
  - 1. Show rooftop locations of fall arrest anchors, configurations, dimensions, attachment details, and components required for complete fall arrest system complying with provisions of this Section and all applicable Federal, State and Local Regulations.
  - 2. Show interface with adjacent materials.

- E . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
- G . Closeout Submittals:
  - 1. Project Record Drawings: Show location of each fall arrest anchor as installed.
  - 2. Submit two copies of reduced plastic laminated as-built drawing showing anchor locations and details for posting near roof access points.
  - 3. Maintenance and Operating Data: Include manufacturer's maintenance procedures, safety inspection log book for yearly inspections, manufacturer's videotape illustrating usage of fall arrest and fall restraint systems, and on-site personal instructions to Owner's personnel in use of equipment.
  - 4. Full Body Harness, Retractable Life Lines, Horizontal Life Lines, and Other Accessory Equipment: Deliver to Owner prior to Substantial Completion. Obtain receipt signed by Owner.

#### 1.5 QUALITY ASSURANCE

- A . Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
  - 1. Carrying specific liability insurance (products and completed operations) in the amount of \$2,000,000.00 to protect against product/system failure.
- B . Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- C . Installer Qualifications: Company approved by manufacturer, specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Decontamination washer, extractor, gear dryer, refrigerator, wall oven and microwaves.

#### 2.2 MANUFACTURERS

- A . Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

## 2.3 MATERIALS

### A . Ice Machine:

1. Product: Manitowoc UY-01040A.
2. Finish: Stainless steel.
3. Size: 26-inches x 28-inches x 38-1/2-inches.
4. Primary Power Input: 115-120 V.
5. Location: Storage.

### B . Under Counter Ice Maker:

1. Product: Whirlpool.
2. Model: WUI75X15HZ.
3. Finish: Stainless Steel.
4. Capacity: 25-lb.
5. Height: 34-1/16-inches.
6. Depth: 26-7/8-inches.

### C . Insta-Hot Dispenser:

1. Product: BUNN.
2. Model: HW2 SST.
3. Material: Stainless Steel.
4. Height: 24.8-inches.
5. Width: 7.1-inches.
6. Depth: 15.1-inches.
7. Installation: Coordinate with Plumbing for fitting at Coffee Station.

### D . Bunker Gear Dryer: OFCI.

### E . SCBA Washer: OFCI.

### F . Front Load Washer and Dryer:

1. Washer Product: LG - 4.5 Cu.Ft. Smart Front-Load Washer.
2. Dryer Product: .4 Cu.Ft. Electric Dryer Wash Tower with Steam and Built-In Intelligence – White.
3. Type: Stacking.
4. Location: Decon.

### G . Dishwasher:

1. Product: LG Dishwashers.
2. Model: LDTS5552 Top Control Dishwasher with Quadwash.
3. Total Place Settings 15.
4. Upper Rack Dish Height Limit: 7.1-inches.

5. Lower Rack Dish Height Limit: 12.5-inches.
6. Tub Material: NeveRust Stainless Steel.

H. Range:

1. Product: THOR Kitchen.
2. Model: HRG4808U / HRG4808ULP.
3. Size: 48-inch.
4. Material: Stainless Steel.
5. Fuel Type: Natural gas / LP convertible.
6. Electrical Requirement: 120V.
7. Total Burners: 6.

I. Refrigerator:

1. Product: LG Refrigeration:
2. Model: LRDCS2603S Bottom Freezer Refrigerator.
3. Capacity: 26 cu.ft.
4. Finish: Stainless Steel.
5. Carton Dimensions (WxHxD) 35-inches x 73-inches x 38-inches.

J. Microwave:

1. Product: LG Electronics.
2. Model: LMC2075 NeoChef Countertop Microwave Oven.
3. 2.0 cu.ft. Oven Capacity.
4. Smart Inverter.
5. EasyClean® Interior.
6. SmoothTouch™ Glass Touch.
7. Hexagonal Stable Ring.
8. LED Interior Light.
9. Available in Black Stainless Steel and Stainless Steel

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 FIELD QUALITY CONTROL

3.5 ADJUSTING

- A . Adjust and lubricate moving parts for proper operation.

3.6 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Section includes manually operated window roller shades.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.3 SUBMITTALS

- A . Qualification Data: For installer.
- B . Product Data: For each type of product.
  - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- C . Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
  - 1. Show guides, enclosures, and accessories as proposed to be installed in each location.
  - 2. Provide accurate to 0.0625 inch; field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
- D . Samples: For each exposed product and for each color and texture specified.
- E . Roller-Shade Schedule: Use same designations indicated on Drawings.
- F . Product certificates.
- G . Product test reports.
- H . Maintenance data.

### 1.4 QUALITY ASSURANCE

- A . Installer Qualifications: Fabricator of products.
  - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.5 COORDINATION

- A . Attend Pre-Con meeting as well as any subcontractor meetings required to coordinate the work.



- B . The WC shall participate and cooperate with the electrical contractor, the window shade manufacturer and the Commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.

#### 1.6 MOCKUP

- A . Window Shade Mockup: Provide in-place visual mockups of single solar shade installation.
- B . Construct mockup of one unit of roller window shades, representing finished work including single shade cloth.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

### **PART 2 - PRODUCTS**

#### 2.1 DESCRIPTION

- A . Manually-operated roller shades with capability for single shade cloth or single blackout shade cloth.

#### 2.2 MANUFACTURERS

- A . Substitutions for products by manufacturers other than those listed: See Section 01 60 00 - Product Requirements.

#### 2.3 WINDOW ROLLER SHADES

##### A . (WCV-1)

1. Basis of Design: RB500 Manual Roller Shade by Hunter Douglas Architectural.
2. Blackout Shade: 0% openness.
3. Fabric: SheerWeave 7000; Onyx.

##### B . (WCV-2)

1. Basis of Design: RB500 Manual Roller Shade by Hunter Douglas Architectural.
2. Blackout Shade: 3% openness.
3. Fabric: SheerWeave 8000; Kohl.

- C . Manual chain operated bottom up with pockets and town down without pockets.

- D . Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

- E . Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Mounting Configuration: Single roller and Double roller, offset with outside over the inside.
  2. Roller Drive-End Location: As indicated.
  3. Direction of Shadeband Roll: Regular, from back of roller.
  4. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- F. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- G. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- H. Shade Cloth:
1. Shade Cloth Material: As indicated on drawings.
  2. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. (RS-1) Blackout shades.
      - 1) Bottom up with pockets.
      - 2) Side channels.
      - 3) Fabric: Verona Twilight Eclipse.
      - 4) Openess: 0%.
      - 5) Locations: As noted in Drawings.
    - b. (RS-2) Light-filtering shades.
      - 1) Bottom up with pockets.
      - 2) Side channels.
      - 3) Fabric: Sheerweave Infinity.
      - 4) Openess: 3%.
      - 5) Locations: As noted in Drawings.
    - c. (RS-3) Light-filtering shades.
      - 1) Top down without pockets.
      - 2) Fabric: Sheerweave Infinity.
      - 3) Openess: 3%.
      - 4) Locations: As noted in Drawings.
    - d. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; anodized aluminum finish.
      - 1) Color: Black.
      - 2) Profile: Square.

I . Installation Accessories:

1. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
  - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open.
  - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
2. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
  - a. Closure-Panel Width: As indicated on Drawings.
3. Side Channels With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
4. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
5. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.4 ROLLER-SHADE FABRICATION

- A . Product Safety Standard: Fabricate roller shades to comply with WCMA A100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B . Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

2.5 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A . Verify that field measurements are as indicated.
- B . Conduct field inspection on an area-by area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
- C . Verifications of conditions: Examine the areas to receive the work and conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work.
- D . Do not proceed until unsatisfactory conditions have been corrected in that area.

### 3.2 ROLLER SHADE INSTALLATION

- A . Install roller shades level, plumb, and aligned with adjacent units, according to manufacturer's written instructions.
  - 1. Shadebands: Located so shadeband is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B . Install roller shades and set intermediate stops of all shades to assure the alignment of the shade bands within a single group.
  - 1. Tolerance: Maximum Variation from alignment shall not exceed +/- 0.125 inches.
- C . Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- D . Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

### 3.3 TOLERANCES

- A . Maintain dimensional tolerances and alignment with adjacent work.
- B . Maximum Variation From Plumb: 1/16 inch.
- C . Maximum Variation From Level: 1/16 inch.
- D . Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

### 3.4 ADJUSTING

- A . Adjust operating assemblies for smooth and noiseless operation.
- B . Adjust, align and balance roller shades to operate smoothly, easily, safely and free from binding or malfunction throughout entire operational range.
- C . Installer shall set Upper, Lower, and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.
- D . Certify the operation of all motorized shades and turn over each floor for preliminary acceptance.

### 3.5 CLEANING

- A . Clean installed components.
- B . Remove labels and visible markings.

END OF SECTION

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES

- A . Countertops for cabinetwork.

### 1.2 RELATED REQUIREMENTS

- A . 06 41 00 - Architectural Wood Casework: For casework supporting countertops.
- B . 10 28 00 - Toilet Accessories: For counter mounted accessories.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A . Preinstallation Meeting: Convene one week before starting work of this section in accordance with Section 01 31 00 - Project Management and Coordination.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

### 1.4 SUBMITTALS

- A . Qualification Data: For design engineer and fabricator.
- B . Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C . Shop Drawings: Complete details of materials and installation.
- D . Sample: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
  - 1. For sealant and accessories submit manufacturer's full range of available colors and patterns for selection.
- E . Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F . Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- G . Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- H . Maintenance Data: For user's operation and maintenance of system including:
  - 1. Methods for maintaining system's materials and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
  - 3. Recommendations on maintenance schedule.

1.5 QUALITY ASSURANCE

- A . Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A . As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A . Casework supported countertops fabricated from quartz/resin.

2.2 MATERIALS

- A . Natural Quartz Countertops:

1. Performance Criteria:

- a. Composition: Up to 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments.
- b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
- c. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
- d. NSF Standard 51 approved for food contact.
- e. Stain Resistance: Passes ANSI Z 124.6.
- f. Quartz Finish: Polished finish with Glossometer reading greater than 45.

2. (SDS-1) Solid Surface Quartz Countertop:

- a. Manufacturer: Wilsonart.
- b. Product: Desert Wind Q4031.
- c. Thickness: 2cm.
- d. Eased edges.

2.3 ACCESSORIES

- A . All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B . Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C . Joint Sealant: Mildew-resistant silicone sealant, as selected by Architect from manufacturer's full range.

## 2.4 FABRICATION

- A . Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B . Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and secure finish surfaces with contact surfaces with a waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C . Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A . Verify existing conditions meet the manufacturer's requirements before starting work.

### 3.2 PREPARATION

- A . Prepare surfaces to receive work in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A . General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B . Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- C . Seal joint between back/end splashes and vertical surfaces.
  - 1. Where indicated use rubber cove molding.
  - 2. Where applied cove molding is not indicated use specified sealant.
- D . Joints between adjacent pieces of surfacing.
  - 1. Securely join with manufacturer's approved adhesive.
  - 2. Fill joints level with surfacing.
  - 3. Clamp or brace surfacing in position until adhesive sets.
  - 4. Joints shall be flush, tight fitting, level, and neat.

3.4 CLEANING

- A . Clean countertops surfaces thoroughly.

3.5 PROTECTION

- A . Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION