

**PROJECT MANUAL**

**PROJECT:**

**2013 BOND PROGRAM:  
BEMIS ELEMENTARY SCHOOL DOOR REPLACEMENT  
(13158E)  
TROY HIGH SCHOOL STEM LAB (13174I)**

**BID PACKAGE NO. 36**

**OWNER:**

**TROY SCHOOL DISTRICT  
4400 LIVERNOIS  
TROY, MICHIGAN 48098**

**TMP PROJECT NOS. 13158E, 13174I**

**DATE: AUGUST 10, 2022**

**ISSUED FOR: CONSTRUCTION DOCUMENTS**

**ARCHITECT**

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**CONSTRUCTION MANAGER**

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| <b><u>STRUCTURAL CONSULTANT</u></b>   | <b><u>ELECTRICAL CONSULTANT</u></b>   |
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|   |   |
|   |   |

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Not Used

**END OF SECTION**



**SECTION 00 0115 - LIST OF DRAWINGS**

**LIST OF DRAWINGS**

**1.01 GENERAL**

- A. Drawings: Drawings consist of the Contract Drawings including drawings listed on the TITLE SHEET page of the separately bound drawing set titled 2013 BOND PROGRAM – TROY HIGH SCHOOL STEM LAB dated 08/10/2022, and any subsequent Addenda and Contract modifications which may occur.

**END OF SECTION**





**SECTION 00 8200 - AVAILABILITY OF ELECTRONIC FILES****AVAILABILITY OF ELECTRONIC FILES****1.01 POLICY**

- A. As a service to Contractor, subcontractors, vendors, material suppliers and others needing electronic copies of Drawings, the Architect will provide CAD files electronically in accordance with the following policy:
  - 1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.
  - 2. It is further understood and agreed that the undersigned will hold TMP Architecture, Inc. and its Consultants harmless and indemnify TMP Architecture, Inc. and its Consultants from all claims, liabilities, losses, and so forth, including attorney's fees arising out of the use or misuse of the transferred files.
  - 3. It is understood and agreed that the files transmitted are prepared from CAD files current at the time of preparation. All files are AutoCAD version 2014 dwg files.
  - 4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.
  - 5. As a record of information to be transmitted, TMP Architecture, Inc. will prepare a duplicate electronic back-up for its record.
  - 6. Compensation Fee for providing this material will be as follows:
    - a. Base Fee of \$250 for 1 to 3 Drawings.
    - b. Base Fee of \$500 for 4 to 10 Drawings.
    - c. For each additional Drawing after 10, the fee is \$40 per Drawing.
      - 1) Example: 11 Drawings = \$540.
  - 7. A signed copy of the Release Form and Fee must be provided before files will be released.

**1.02 REQUEST PROCEDURE**

- A. To receive Drawing CAD files the Release Form must be completed in full and submitted to the Construction Manager to be forwarded to the Project Manager at TMP Architecture, Inc.
  - 1. A signed copy of the Release Form must be submitted.
    - a. Faxed or emailed copies will be accepted.
  - 2. Upon remittance of the signed Release Form and Fee, allow five working days for processing.
  - 3. Transmission of Drawings will be provided electronically after the receipt of Fee.

**1.03 RELEASE FORM**

- A. Release Form is located immediately after this Section. Refer to Section 00 8200.01 Electronic Files Release Form.

**END OF SECTION**

**SECTION 00 8200.02 - TMP ELECTRONIC FILES RELEASE FORM (FREE)****RE: AUTHORIZATION FORM FOR CAD FILE TRANSFERS**

**I. PROJECT NAME:** \_\_\_\_\_  
**I. TMP PROJECT NO. :** \_\_\_\_\_ **BID PACK NO.**

1.

1. Dear Sir/Madam:

1. Per your request, TMP Architecture, Inc. will electronically transmit requested CAD files upon receipt of an original signed copy of this form which states the conditions of agreement and the receipt of the required compensation fee.

1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.

2. It is further understood and agreed that the undersigned will hold TMP Architecture, Inc. and its Consultants harmless and indemnify TMP Architecture, Inc. and its Consultants from all claims, liabilities, losses, and so forth, including attorney's fees arising out of the use or misuse of the transferred files.

3. It is understood and agreed that the items transmitted are prepared from CAD files current at the time of preparation. All files are [AutoCAD version 2014 dwg files].

4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.

5. As a record of information to be transmitted, TMP Architecture, Inc. will prepare a duplicate electronic back-up for its record.

6. Compensation for providing this material will be as follows: **\$0.00 / No Charge**

7. A signed copy of this form must be provided before files will be released. Please remit to [Construction Manager] to be forwarded to the Project Manager at TMP Architecture, Inc. and allow five working days for processing.

**I.****I. REQUESTED DRAWINGS:** \_\_\_\_\_**I.****I.****I.****I. FIRM REQUESTING FILES:**

1. Company: \_\_\_\_\_

1. Address: \_\_\_\_\_

1. Signed: \_\_\_\_\_ Date: \_\_\_\_\_

1. Printed Name / Title: \_\_\_\_\_

1. Email: \_\_\_\_\_

**TO BE COMPLETED BY TMP ARCHITECTURE, INC.****I.**

1. Released(signed by): \_\_\_\_\_ TMP Architecture, Inc.

1. Printed Name/Title: \_\_\_\_\_ Date: \_\_\_\_\_

1.

**END OF SECTION**

**SECTION 01 2500 - SUBSTITUTION PROCEDURES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 2500.01 - TMP Substitution Request Form.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION****3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. Forms included in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

**3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Substitution Request Form: TMP Substitution Request Form must be completed and provided at the beginning of each substitution request.
  - 1. Refer to Section 01 2500.01 - TMP Substitution Request Form.
  - 2. Submittals without a completed TMP Substitution Request Form will not be acknowledged, reviewed, or returned. Use only this form; other forms of submission are unacceptable.
- B. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period.

**3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Substitution Request Form: TMP Substitution Request Form must be completed and provided at the beginning of each substitution request.
  - 1. Refer to Section 01 2500.01 - TMP Substitution Request Form.

2. Submittals without a completed TMP Substitution Request Form will not be acknowledged, reviewed, or returned. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
  1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
    - b. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
  1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  2. Without a separate written request.

#### **3.04 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
  1. During construction, Architect's decision following review of proposed substitution will be noted on the submitted form.
  2. During bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected.

#### **3.05 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

#### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

#### **END OF SECTION**

**SECTION 01 2500.01 - TMP SUBSTITUTION REQUEST FORM**

SUBSTITUTION REQUEST NUMBER: \_\_\_\_\_ DATE SUBMITTED: \_\_\_\_\_  
TMP PROJECT NUMBER \_\_\_\_\_ PROJECT NAME: \_\_\_\_\_

**SPECIFIED ITEM**

SPECIFICATION TITLE: \_\_\_\_\_  
SPECIFICATION SECTION \_\_\_\_\_ SPECIFICATION ARTICLE/PARAGRAPH: \_\_\_\_\_  
SPECIFIED PRODUCT / DESCRIPTION: \_\_\_\_\_  
SPECIFIED MANUFACTURER: \_\_\_\_\_  
SPECIFIED PRODUCT / MODEL: \_\_\_\_\_  
REASON SPECIFIED ITEM CANNOT BE PROVIDED: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROPOSED SUBSTITUTION**

DESCRIPTION OF PROPOSED SUBSTITUTION: \_\_\_\_\_  
\_\_\_\_\_  
PROPOSED MANUFACTURER: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
WEBSITE: \_\_\_\_\_  
PRODUCT / MODEL: \_\_\_\_\_  
YEARS PRODUCT/MODEL HAS BEEN MANUFACTURED: \_\_\_\_\_  
DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED ITEM: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WILL PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK? ☐ NO ☐ YES  
IF YES, EXPLAIN HOW: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

HOW WILL SUBSTITUTION BENEFIT THE OWNER: ☐ COST SAVINGS ☐ TIME SAVINGS ☐ OTHER  
PROVIDE SPECIFIC DETAILS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**THE FOLLOWING INFORMATION IS REQUIRED; CHECK TO INDICATE INFORMATION IS ATTACHED. (REQUEST WILL BE REJECTED WITHOUT REQUIRED DATA)**

**32.01**

- A. ☐ List of references where proposed product has been installed; include address, owner, architect, and date installed.
- B. ☐ Product data sheets.
- C. ☐ Applicable certificates and test reports.

- D. ☐ Comparative Data: Provide point-by-point, side-by-side comparison of specified product and proposed substitution addressing essential attributes specified.

**INDICATE WHICH OF THE FOLLOWING VOLUNTARY INFORMATION IS ATTACHED, IF ANY:**

☐ **DRAWINGS.**

☐ **SAMPLES.**

☐ **OTHER ITEMS:** \_\_\_\_\_

**SIGNATURE**

**THE UNDERSIGNED CERTIFIES:**

I.

1. The proposed substitution meets or exceeds the quality level of the specified product, equipment, assembly, or system.
1. To provide the same warranty for the substitution as for the specified product.
1. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
1. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
1. The proposed substitution will have no adverse effects on other work.
1. The proposed substitution will not affect project schedule.
1. Waives claims for additional costs or time extension that may subsequently become apparent.

**CONTRACTOR / COMPANY:** \_\_\_\_\_

**SIGNED BY:** \_\_\_\_\_ **PRINTED NAME:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**EMAIL:** \_\_\_\_\_ **PHONE:** \_\_\_\_\_

**ARCHITECT'S RESPONSE**

I.

- A. During bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected.
- B. During construction, Architect will notify Contractor in writing (see below) of decision to accept or reject request, and incorporate the substitution into the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments as provided for in the Conditions of the Contract.

☐ **SUBSTITUTION APPROVED - PROVIDE SUBMITTALS PER SECTION 01 3000 AND RESPECTIVE SECTION FOR WHICH SUBSTITUTION WAS MADE.**

☐ **SUBSTITUTION REJECTED - PROVIDE SPECIFIED MATERIALS.**

**SIGNED BY:** \_\_\_\_\_ **PRINTED NAME:** \_\_\_\_\_

**ARCHITECT'S COMMENTS:** \_\_\_\_\_

**END OF SECTION**

**SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Submittals for review, information, and project closeout.
- B. Number of copies of submittals.
- C. Requests for Interpretation (RFI) procedures.
- D. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 3000.01 - TMP Submittal and Sample Transmittal Form.

**1.03 REFERENCE STANDARDS**

- A. AIA G716 - Request for Information 2004.
- B. CSI/CSC Form 13.2A - Request for Information Current Edition.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION****3.01 REQUESTS FOR INTERPRETATION (RFI)**

- A. Definition: A request seeking one of the following:
  - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  - 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    - b. Do not forward requests which solely require internal coordination between subcontractors.
  - 2. Prepare in a format and with content acceptable to Architect. Use one of the following:
    - a. Use AIA G716 - Request for Information .
    - b. Use CSI/CSC Form 13.2A - Request for Interpretation.
    - c. Other format acceptable to Architect.
  - 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  - 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  - 2. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response and may include an explanatory notation.
  - 3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response and may include an explanatory notation.
    - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Discrete and consecutive RFI number, and descriptive subject/title.
  3. Issue date, and requested reply date.
  4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  5. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  6. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  2. Note dates of when each request is made, and when a response is received.
  3. Identify and include improper or frivolous RFIs.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
  4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### **3.02 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule.
  2. Coordinate with Contractor's construction schedule and schedule of values.
  3. Format schedule to allow tracking of status of submittals throughout duration of construction.
  4. Arrange information to include scheduled date for initial submittal, specification number and title, description of item of work covered, and role and name of subcontractor.
  5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.



- a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### **3.03 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

### **3.04 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.05 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.06 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy.
- B. Samples: Submit the number specified in individual specification sections, but not less than 3; one (minimum) of which will be retained by Architect.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.07 SUBMITTAL PROCEDURES**

- A. Transmittal Form: TMP Submittal and Sample Transmittal Form must be completed and provided at the beginning of each submittal.
  - 1. Refer to Section 01 3000.01 - TMP Submittal and Sample Transmittal Form.
  - 2. Submittals without a completed TMP Submittal and Sample Transmittal Form will not be acknowledged, reviewed, or returned.
- B. Submittals shall be submitted in electronic form.
  - 1. Exceptions: Physical samples.

- a. Physical Samples must be accompanied by an electronic copy and a hard/physical copy of the completed TMP Submittal and Sample Transmittal Form.
- C. Electronic Submittals: Comply with the following:
  - 1. Submittal process shall be through a data management system (i.e. Submittal Exchange) or other approved method agreed to by the Architect and Owner.
  - 2. File Format: Portable Document Format (PDF).
  - 3. File Naming: File naming shall be in the following format:
    - a. Specification section number, followed by a hyphen, and a consecutive number indicating sequential submittals for that section; followed by a general description of the submittal contents.
      - 1) Examples:
        - (a) Section 07 9200; first submittal:
          - (1) 07 9200-01 Joint Sealants
        - (b) Section 07 9200; second submittal:
          - (1) 07 9200-02 Joint Sealant Color
      - b. Resubmittals. For revised resubmittals use original number and a sequential combination numerical and alphabetical suffix; hyphen followed by "R" and a two-digit consecutive number indicating sequential resubmittals for that particular submittal.
        - 1) Examples:
          - (a) Section 07 9200; resubmittal of first submittal of section:
            - (1) 07 9200-01-R01 Joint Sealants.
          - (b) Section 07 9200; second resubmittal of first submittal of section:
            - (1) 07 9200-01-R02 Joint Sealants
          - (c) Section 07 9200; first resubmittal of second submittal of section:
            - (1) 07 9200-02-R01 Joint Sealant Color
    - 4. Each Submittal shall be one file, complete with all attachments.
      - a. Multi-file submittal will not be acknowledged, reviewed, or returned.
  - D. General Requirements:
    - 1. Use a single transmittal for related items.
      - a. Each transmittal shall be for one specification section only; do not submit items for multiple sections under the same transmittal.
        - 1) Multi-section submittals will be acknowledged and returned; stamped "X - Not Approved - Resubmit".
    - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
    - 3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
    - 4. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - 5. Schedule submittals to expedite the Project, and coordinate submission of related items.
      - a. For each submittal for review, allow 14 calendar days excluding delivery time to and from the Contractor.
      - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 calendar days.
    - 6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
    - 7. When revised for resubmission, identify all changes made since previous submission.
    - 8. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
    - 9. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

10. Submittals not requested will be recognized and returned; stamped "NA - No Action Taken - Not Reviewed"
- E. Product Data Procedures:
  1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Submit concurrently with related shop drawing submittal.
  4. Do not submit (Material) Safety Data Sheets for materials or products unless specifically called for in individual sections.
- F. Shop Drawing Procedures:
  1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
  4. Non-complying submittals will be acknowledged and returned; stamped "X - Not Approved - Resubmit".
- G. Samples Procedures:
  1. Transmit related items together as single package.
  2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  3. Submit actual physical samples.
  4. Electronic submittals will not be accepted unless prior approval is received from the Architect. Electronic samples without prior approval will be acknowledged and returned; stamped "X - Not Approved - Resubmit."

### **3.08 SUBMITTAL REVIEW**

- A. General: Submittals that do not conform to the requirements of this section will not be acknowledged, reviewed, or returned.
- B. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- C. Submittals for Information: Architect will acknowledge and may review. See below for actions to be taken.
- D. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  1. Where more than one action has been indicated, each shall apply to that portion of the submittal for which the action is indicated.
- E. Architect's review shall not indicate approval of dimensions, quantities or fabrication processes unless specific notations are made by the Architect regarding same.
- F. Architect's and consultants' actions on items submitted for review:
  1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Reviewed - No Exceptions Taken", "Approved", or language with same legal meaning.
    - b. "Reviewed with Corrections Noted", "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
      - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
  2. Not Authorizing fabrication, delivery, and installation:
    - a. "Not Approved - Resubmit", "Revise and Resubmit", or language with the same legal meaning.
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.

G. Architect's and consultants' actions on items submitted for information:

1. Items for which no action was taken:

- a. "No Action Taken - Not Reviewed" or "Received" - to notify the Contractor that the submittal has been received for record only.

**END OF SECTION**

**SECTION 01 4000 - QUALITY REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

Section includes administrative and procedural requirements for quality assurance and quality control.

- A. Testing and inspection 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. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

**1.02 DEFINITIONS**

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- 1.03 DELEGATED-DESIGN SERVICES**
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
- 1.04 CONFLICTING REQUIREMENTS**
- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements 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 direction 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.
- 1.05 ACTION SUBMITTALS**
- A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- 1.06 INFORMATIONAL SUBMITTALS**
- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
1. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- B. 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.
- C. Permits, Licenses, and Certificates: For Owner's record, 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.
- 1.07 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, telephone number, and email address 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 inspection.
  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. Statement on condition of substrates and their acceptability for installation of product.
  2. Statement that products at Project site comply with requirements.
  3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  5. 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. Statement that equipment complies with requirements.
  2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  3. Other required items indicated in individual Specification Sections.

#### **1.08 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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, applying, 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 inspection 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.
- 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - d. When testing is complete, remove test specimens and test assemblies, and mockups; 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, 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.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups of size indicated.
  - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
  - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
  - 7. Allow seven days for initial review and each re-review of each mockup.
  - 8. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 9. Retain subparagraph below as the default requirement and add specific requirements in individual Specification Sections.
  - 10. Demolish and remove mockups when directed unless otherwise indicated.

#### **1.09 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 inspection they are engaged to perform.
  - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
  - 1. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.



- C. 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.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the locations 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 duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
- F. 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.
- G. Associated Contractor Services: Cooperate with agencies and representatives 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 inspection. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 6. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

**1.010 SPECIAL TESTS AND INSPECTIONS**

- A. Special Tests and Inspections: Owner will engage a qualified testing agency/special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections on the drawings and the schedule of Special Inspections attached to this Section, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION****3.01 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 reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

**3.02 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "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.

| <b>SCHEDULE OF SPECIAL INSPECTION SERVICES</b>  |  |                                   |               |               |                       |
|---|--|-----------------------------------|---------------|---------------|-----------------------|
| <b>PROJECT</b>  |  |                                   |               |               |                       |
| <b>MATERIAL / ACTIVITY</b>  | <b>SERVICE</b>                                     | <b>APPLICABLE TO THIS PROJECT</b> |               |               |                       |
|   |  | <b>Y/N</b>                        | <b>EXTENT</b> | <b>AGENT*</b> | <b>DATE COMPLETED</b> |
| <b>1704.2.5 Inspection of Fabricators</b>   |  |                                   |               |               |                       |
| Verify fabrication/quality control procedures   | In-plant review (3)                                | Y                                 | Periodic      |               |                       |
| <b>1705.1.1 Special Cases</b> (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements) | Submittal review, shop (3) and/or field inspection | N                                 |               |               |                       |
| <b>1705.2 Steel Construction</b>  |  |                                   |               |               |                       |

|  |   |   |                                 |  |  |
|--|---|---|---------------------------------|--|--|
| 1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, chapter N, paragraph 3.2 for compliance with construction documents) | Submittal Review  | Y | Each submittal                  |  |  |
| 2. Material verification of structural steel   | Shop (3) and field inspection                               | Y | Periodic                        |  |  |
| 3. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)  | Field inspection  | Y | Periodic                        |  |  |
| 4. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents                           | Field inspection  | Y | Periodic                        |  |  |
| 5. Structural steel welding:   |   |   |                                 |  |  |
| a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)                        | Shop (3) and field inspection                               | Y | Observe or Perform as noted (4) |  |  |
| b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2)                          | Shop (3) and field inspection                               | Y | Observe (4)                     |  |  |
| c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3)                           | Shop (3) and field inspection                               | Y | Observe or Perform as noted (4) |  |  |
| d. Nondestructive testing (NDT) of welded joints: <i>see Commentary</i>  |   |   |                                 |  |  |
| 1) Complete penetration groove welds 5/16" or greater in <i>risk category</i> III or IV  | Shop (3) or field ultrasonic testing - 100%                 | N | Periodic                        |  |  |
| 2) Complete penetration groove welds 5/16" or greater in <i>risk category</i> II   | Shop (3) or field ultrasonic testing - 10% of welds minimum | Y | Periodic                        |  |  |
| 3) Thermally cut surfaces of access holes when material $t > 2"$   | Shop (3) or field magnetic Partical or Penetrant testing    | N | Periodic                        |  |  |
| 4) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1   | Shop (3) or field radiographic or Ultrasonic testing        | N | Periodic                        |  |  |
| 5) Fabricator's NDT reports when fabricator performs NDT   | Verify reports  | Y | Each submittal (5)              |  |  |

|   |   |   |                                 |  |  |
|---|---|---|---------------------------------|--|--|
| 6. Structural steel bolting:  | Shop (3) and field inspection             |   |                                 |  |  |
| a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1) |   | Y | Observe or Perform as noted (4) |  |  |
| b. Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360, Table N5.6-2)  |   | Y | Observe (4)                     |  |  |
| 1) Pre-tensioned and slip-critical joints   |   |   |                                 |  |  |
| a) Turn-of-nut with matching markings   |   | Y | Periodic                        |  |  |
| b) Direct tension indicator   |   | Y | Periodic                        |  |  |
| c) Twist-off type tension control bolt  |   | Y | Periodic                        |  |  |
| d) Turn-of-nut without matching markings  |   | Y | Continuous                      |  |  |
| e) Calibrated wrench  |   | Y | Continuous                      |  |  |
| 2) Snug-tight joints  |   | Y | Periodic                        |  |  |
| c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)                 |   | Y | Perform (4)                     |  |  |
| 7. Inspection of steel elements of composite construction prior to concrete placement in accordance with QA tasks listed in AISC 360, Table N6.1          | Shop (3) and field inspection and testing | N |                                 |  |  |
| <b>1705.2.2 Steel Construction Other Than Structural Steel</b>  |   |   |                                 |  |  |
| 1. Material verification of cold-formed steel deck:   |   |   |                                 |  |  |
| a. Identification markings  | Field inspection                          | Y | Periodic                        |  |  |
| b. Manufacturer's certified test reports  | Submittal Review                          | Y | Each submittal                  |  |  |
| 2. Connection of cold-formed steel deck to supporting structure:  | Shop (3) and field inspection             |   |                                 |  |  |
| a. Welding  |   | Y | Periodic                        |  |  |
| b. Other fasteners (in accordance with AISC 360, Section N6)  |   | Y | Periodic                        |  |  |

|  |                               |   |   |  |  |
|--|-------------------------------|---|---|--|--|
| 1) Verify fasteners are in conformance with approved submittal   |                               | Y | Periodic  |  |  |
| 2) Verify fastener installation is in conformance with approved submittal and manufacturer's recommendations   |                               | Y | Periodic  |  |  |
| 3. Reinforcing steel   | Shop (3) and field inspection |   |   |  |  |
| a. Verification of weldability of steel other than ASTM A706   |                               | N |   |  |  |
| b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, boundary elements of special concrete structural walls and shear reinforcement   |                               | N | Continuous  |  |  |
| c. Shear reinforcement   |                               | N | Continuous  |  |  |
| d. Other reinforcing steel   |                               | N | Periodic  |  |  |
| 4. Cold-formed steel trusses spanning 60 feet or greater   |                               |   |   |  |  |
| a. Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package  | Field inspection              | Y | Periodic  |  |  |
| <b>1705.3 Concrete Construction</b>  |                               |   |   |  |  |
| 1. Inspection of reinforcing steel installation (see 1705.2.2 for welding)   | Shop (3) and field inspection | Y | Periodic  |  |  |
| 2. Inspection of prestressing steel installation   | Shop (3) and field inspection | N | Periodic  |  |  |
| 3. Inspection of anchors cast in concrete where allowable loads have been increased per section 19 08.5 or where strength design is used   | Shop (3) and field inspection | Y | Periodic  |  |  |
| 4. Inspection of anchors and reinforcing steel post-installed in hardened concrete: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque | Field inspection              | Y | Periodic or as required by the research report issued by an approved source |  |  |

|  |  |   |   |  |  |
|--|--|---|---|--|--|
| 5. Verify use of approved design mix   | Shop (3) and field inspection                  | Y | Periodic                                  |  |  |
| 6. Fresh concrete sampling, perform slump and air content tests and determine temperature of concrete  | Shop (3) and field inspection                  | Y | Continuous                                |  |  |
| 7. Inspection of concrete and shotcrete placement for proper application techniques  | Shop (3) and field inspection                  | Y | Continuous                                |  |  |
| 8. Inspection for maintenance of specified curing temperature and techniques   | Shop (3) and field inspection                  | Y | Periodic                                  |  |  |
| 9. Inspection of prestressed concrete:   | Shop (3) and field inspection                  |   |   |  |  |
| a. Application of prestressing force   |  | N | Continuous                                |  |  |
| b. Grouting of bonded prestressing tendons in the seismic-force-resisting system   |  | N | Continuous                                |  |  |
| 10. Erection of precast concrete members   | Field Inspection                               | Y | Periodic                                  |  |  |
| a. Inspect in accordance with construction documents   | Field inspection                               | N | In accordance with construction documents |  |  |
| b. Perform inspections of welding and bolting in accordance with Section 17 05.2   | Field inspection                               | N | In accordance with Section 17 05.2        |  |  |
| 11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs | Review field testing and laboratory reports    | N | Periodic                                  |  |  |
| 12. Inspection of formwork for shape, lines, location and dimensions   | Field inspection                               | Y | Periodic                                  |  |  |
| 13. Concrete strength testing and verification of compliance with construction documents   | Field testing and review of laboratory reports | Y | Periodic                                  |  |  |
| <b>1705.4 Masonry Construction</b>   |  |   |   |  |  |
| <b>(A) Level A, B and C Quality Assurance:</b>   |  |   |   |  |  |
| 1. Verify compliance with approved submittals  | Field Inspection                               | Y | Periodic                                  |  |  |
| <b>(B) Level B Quality Assurance:</b>  |  |   |   |  |  |

|   |  |   |                      |  |  |
|---|--|---|----------------------|--|--|
| 1. Verification of $f'_m$ and $f'_{AAC}$ prior to construction  | Testing by unit strength method or prism test method | Y | Periodic             |  |  |
| <b>(C) Level C Quality Assurance:</b>   |  |   |                      |  |  |
| 1. Verification of $f'_m$ and $f'_{AAC}$ prior to construction and for every 5,000 SF during construction   | Testing by unit strength method or prism test method | N | Periodic             |  |  |
| 2. Verification of proportions of materials in premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout, as delivered to the project site | Field inspection                                     | N | Continuous           |  |  |
| 3. Verify placement of masonry units  | Field Inspection                                     | N | Periodic             |  |  |
| <b>(D) Levels B and C Quality Assurance:</b>  |  |   |                      |  |  |
| 1. Verification of Slump Flow and Visual Stability Index (VSI) of self-consolidating grout as delivered to the project  | Field testing  | Y | Continuous           |  |  |
| 2. Verify compliance with approved submittals   | Field inspection                                     | Y | Periodic             |  |  |
| 3. Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons   | Field Inspection                                     | Y | Periodic             |  |  |
| 4. Verify grade, type, and size of reinforcement and anchor bolts, and prestressing tendons and anchorages  | Field Inspection                                     | Y | Periodic             |  |  |
| 5. Verify construction of mortar joints   | Field Inspection                                     | Y | Periodic             |  |  |
| 6. Verify placement of reinforcement, connectors, and prestressing tendons and anchorages   | Field Inspection                                     | Y | Level B – Periodic   |  |  |
|   |  | N | Level C – Continuous |  |  |
| 7. Verify grout space prior to grouting   | Field Inspection                                     | Y | Level B – Periodic   |  |  |

|  |                  |   |                      |  |  |
|--|------------------|---|----------------------|--|--|
|  |                  | N | Level C – Continuous |  |  |
| 8. Verify placement of grout and prestressing grout for bonded tendons   | Field Inspection | N | Continuous           |  |  |
| 9. Verify size and location of structural masonry elements   | Field Inspection | Y | Periodic             |  |  |
| 10. Verify type, size, and location of anchors, including details of anchorage of masonry to structural members, frames, or other construction.      | Field inspection | Y | Level B – Periodic   |  |  |
|  |                  | N | Level C – Continuous |  |  |
| 11. Verify welding of reinforcement (see 1705.2.2)   | Field inspection | N | Continuous           |  |  |
| 12. Verify preparation, construction, and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F) | Field inspection | Y | Periodic             |  |  |
| 13. Verify application and measurement of prestressing force   | Field Inspection | N | Continuous           |  |  |
| 14. Verify placement of AAC masonry units and construction of thin-bed mortar joints (first 5000 SF of AAC masonry)                                  | Field inspection | N | Continuous           |  |  |
| 15. Verify placement of AAC masonry units and construction of thin-bed mortar joints (after the first 5000 SF of AAC masonry)                        | Field inspection | N | Level B – Periodic   |  |  |
|  |                  | N | Level C – Continuous |  |  |
| 16. Verify properties of thin-bed mortar for AAC masonry (first 5000 SF of AAC masonry)  | Field inspection | N | Continuous           |  |  |
| 17. Verify properties of thin-bed mortar for AAC masonry (after the first 5000 SF of AAC masonry)  | Field inspection | N | Level B – Periodic   |  |  |



|  |                     |   |                      |  |  |
|--|---------------------|---|----------------------|--|--|
|  |                     | N | Level C – Continuous |  |  |
| 18. Prepare grout and mortar specimens   | Field testing       | Y | Level B – Periodic   |  |  |
|  |                     | N | Level C – Continuous |  |  |
| 19. Observe preparation of prisms  | Field inspection    | Y | Level B – Periodic   |  |  |
|  |                     | N | Level C – Continuous |  |  |
| 1705.5 Wood Construction   |                     |   |                      |  |  |
| 1. Inspection of the fabrication process of wood structural elements and assemblies in accordance with Section 17 04.2.5   | In-plant review (3) | N | Periodic             |  |  |
| 2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans   | Field inspection    | N | Periodic             |  |  |
| 3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans | Field inspection    | N | Periodic             |  |  |
| 4. Metal-plate-connected wood trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package  | Field inspection    | N | Periodic             |  |  |
| 1705.6 Soils   |                     |   |                      |  |  |
| 1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.   | Field inspection    | Y | Periodic             |  |  |
| 2. Verify excavations are extended to proper depth and have reached proper material.   | Field inspection    | Y | Periodic             |  |  |
| 3. Perform classification and testing of controlled fill materials.  | Field inspection    | Y | Periodic             |  |  |

|  |                              |   |   |  |  |
|--|------------------------------|---|---|--|--|
| 4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill  | Field inspection             | Y | Continuous                                |  |  |
| 5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly   | Field inspection             | Y | Periodic                                  |  |  |
| <b>1705.7 Driven Deep Foundations</b>  |                              |   |   |  |  |
| 1. Verify element materials, sizes and lengths comply with requirements  | Field inspection             | N | Continuous                                |  |  |
| 2. Determine capacities of test elements and conduct additional load tests, as required  | Field inspection             | N | Continuous                                |  |  |
| 3. Observe driving operations and maintain complete and accurate records for each element  | Field inspection             | N | Continuous                                |  |  |
| 4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element | Field inspection             | N | Continuous                                |  |  |
| 5. For steel elements, perform additional inspections per Section 17 05.2  | See Section 17 05.2          | N | See Section 17 05.2                       |  |  |
| 6. For concrete elements and concrete-filled elements, perform additional inspections per Section 17 05.3  | See Section 17 05.3          | N | See Section 17 05.3                       |  |  |
| 7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge  | Field inspection             | N | In accordance with construction documents |  |  |
| 8. Perform additional inspections and tests in accordance with the construction documents  | Field Inspection and testing | N | In accordance with construction documents |  |  |
| <b>1705.8 Cast-in-Place Deep Foundations</b>   |                              |   |   |  |  |
| 1. Observe drilling operations and maintain complete and accurate records for each element   | Field inspection             | N | Continuous                                |  |  |

|  |                               |   |   |  |  |
|--|-------------------------------|---|---|--|--|
| 2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes | Field inspection              | N | Continuous                                |  |  |
| 3. For concrete elements, perform additional inspections in accordance with Section 17 05.3  | See Section 17 05.3           | N | See Section 17 05.3                       |  |  |
| 4. Perform additional inspections and tests in accordance with the construction documents  | Field Inspection and testing  | N | In accordance with construction documents |  |  |
| <b>1705.9 Helical Pile Foundations</b>   |                               |   |   |  |  |
| 1. Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other data as required.  | Field inspection              | N | Continuous                                |  |  |
| 2. Perform additional inspections and tests in accordance with the construction documents  | Field Inspection and testing  | N | In accordance with construction documents |  |  |
| <b>1705.10.1 Structural Wood Special Inspections For Wind Resistance</b>   |                               |   |   |  |  |
| 1. Inspection of field gluing operations of elements of the main windforce-resisting system  | Field inspection              | N | Continuous                                |  |  |
| 2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system  | Shop (3) and field inspection | N | Periodic                                  |  |  |
| <b>1705.10.2 Cold-formed Steel Special Inspections For Wind Resistance</b>   |                               |   |   |  |  |
| 1. Inspection during welding operations of elements of the main windforce-resisting system   | Shop (3) and field inspection | N | Periodic                                  |  |  |
| 2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system   | Shop (3) and field inspection | N | Periodic                                  |  |  |

|  |                               |   |                             |  |  |
|--|-------------------------------|---|-----------------------------|--|--|
| <b>1705.10.3 Wind-resisting Components</b>   |                               |   |                             |  |  |
| 1. Roof cladding   | Shop (3) and field inspection | Y | Periodic                    |  |  |
| 2. Wall cladding   | Shop (3) and field inspection | Y | Periodic                    |  |  |
| <b>1705.11.1 Structural Steel Special Inspections for Seismic Resistance</b>   |                               |   |                             |  |  |
| Inspection of structural steel in accordance with AISC 341   | Shop (3) and field inspection | N | In accordance with AISC 341 |  |  |
| <b>1705.11.2 Structural Wood Special Inspections for Seismic Resistance</b>  |                               |   |                             |  |  |
| 1. Inspection of field gluing operations of elements of the seismic-force resisting system   | Field inspection              | N | Continuous                  |  |  |
| 2. Inspection of nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system                           | Shop (3) and field inspection | N | Periodic                    |  |  |
| <b>1705.11.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance</b>   |                               |   |                             |  |  |
| 1. Inspection during welding operations of elements of the seismic-force-resisting system  | Shop (3) and field inspection | N | Periodic                    |  |  |
| 2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system                | Shop (3) and field inspection | N | Periodic                    |  |  |
| <b>1705.11.4 Designated Seismic Systems Verification</b>   |                               |   |                             |  |  |
| Inspect and verify that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with Section 17 05.12.3 | Field inspection              | N | Periodic                    |  |  |

|  |                  |   |          |  |  |
|--|------------------|---|----------|--|--|
| <b>1705.11.5 Architectural Components Special Inspections for Seismic Resistance</b>   |                  |   |          |  |  |
| 1. Inspection during the erection and fastening of exterior cladding and interior and exterior veneer  | Field inspection | N | Periodic |  |  |
| 2. Inspection during the erection and fastening of interior and exterior nonbearing walls  | Field inspection | N | Periodic |  |  |
| 3. Inspection during anchorage of access floors  | Field inspection | N | Periodic |  |  |
| <b>1705.11.6 Mechanical and Electrical Components Special Inspections for Seismic Resistance</b>   |                  |   |          |  |  |
| 1. Inspection during the anchorage of electrical equipment for emergency or standby power systems  | Field inspection | N | Periodic |  |  |
| 2. Inspection during the anchorage of other electrical equipment   | Field inspection | N | Periodic |  |  |
| 3. Inspection during installation and anchorage of piping systems designed to carry hazardous materials, and their associated mechanical units | Field inspection | N | Periodic |  |  |
| 4. Inspection during the installation and anchorage of HVAC ductwork that will contain hazardous materials                                     | Field inspection | N | Periodic |  |  |
| 5. Inspection during the installation and anchorage of vibration isolation systems   | Field inspection | N | Periodic |  |  |
| <b>1705.11.7 Storage Racks Special Inspections for Seismic Resistance</b>  |                  |   |          |  |  |
| Inspection during the anchorage of storage racks 8 feet or greater in height   | Field inspection | N | Periodic |  |  |
| <b>1705.11.8 Seismic Isolation Systems</b>   |                  |   |          |  |  |

|   |                                    |   |                |  |  |
|---|------------------------------------|---|----------------|--|--|
| Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system  | Shop and field inspection          | N | Periodic       |  |  |
| <b>1705.12.1 Concrete Reinforcement Testing and Qualification for Seismic Resistance</b>  |                                    |   |                |  |  |
| 1. Review certified mill test reports for each shipment of reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls | Review certified mill test reports | N | Each shipment  |  |  |
| 2. Verify reinforcement weldability of ASTM A615 reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls           | Review test reports                | N | Each shipment  |  |  |
| <b>1705.12.2 Structural Steel Testing and Qualification for Seismic Resistance</b>  |                                    |   |                |  |  |
| Test in accordance with the quality assurance requirements of AISC 341  | Shop (3) and field testing         | N | Per AISC 341   |  |  |
| <b>1705.12.3 Seismic Certification of Nonstructural Components</b>  |                                    |   |                |  |  |
| Review certificate of compliance for designated seismic system components.  | Certificate of compliance review   | N | Each submittal |  |  |
| <b>1705.12.4 Seismic Isolation Systems</b>  |                                    |   |                |  |  |
| Test seismic isolation system in accordance with ASCE 7 Section 17.8  | Prototype testing                  | N | Per ASCE 7     |  |  |

|   |                              |   |                            |  |  |
|---|------------------------------|---|----------------------------|--|--|
| <b>1705.13 Sprayed Fire-resistant Materials</b>   |                              |   |                            |  |  |
| 1. Verify surface condition preparation of structural members   | Field inspection             | N | Periodic                   |  |  |
| 2. Verify application of sprayed fire-resistant materials   | Field inspection             | N | Periodic                   |  |  |
| 3. Verify average thickness of sprayed fire-resistant materials applied to structural members   | Field inspection             | N | Periodic                   |  |  |
| 4. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design   | Field inspection and testing | N | Per IBC Section 17 05.13.5 |  |  |
| 5. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material  | Field inspection and testing | N | Per IBC Section 17 05.13.6 |  |  |
| <b>1705.14 Mastic and Intumescent Fire-Resistant Coatings</b>   |                              |   |                            |  |  |
| Inspect mastic and intumescent fire-resistant coatings applied to structural elements and decks   | Field inspection             | N | Periodic                   |  |  |
| <b>1705.15 Exterior Insulation and Finish Systems (EIFS)</b>  |                              |   |                            |  |  |
| 1. Verify materials, details and installations are per the approved construction documents  | Field inspection             | N | Periodic                   |  |  |
| 2. Inspection of water-resistive barrier over sheathing substrate   | Field inspection             | N | Periodic                   |  |  |
| <b>1705.16 Fire-Resistant Penetrations and Joints</b>   |                              |   |                            |  |  |
| 1. Inspect penetration firestop systems   | Field testing                | N | Per ASTM E2174             |  |  |
| 2. Inspect fire-resistant joint systems   | Field testing                | N | Per ASTM E2393             |  |  |
| <b>1705.17 Smoke Control Systems</b>  |                              |   |                            |  |  |
| 1. Leakage testing and recording of device locations prior to concealment   | Field testing                | N | Periodic                   |  |  |
| 2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification | Field testing                | N | Periodic                   |  |  |
| <b>* INSPECTION AGENTS</b>  |                              |   |                            |  |  |

| FIRM  | ADDRESS | TELEPHONE NO. |
|---|---------|---------------|
| 1.  |         |               |
| 2.  |         |               |
| 3.  |         |               |
| 4.  |         |               |
| <p><i>Notes: 1. The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Special Inspector(s) and/or testing agencies may be subject to the approval of the Building Official and/or the Design Professional.</i></p> <p><i>2. The list of Special Inspectors may be submitted as a separate document, if noted so above.</i></p> <p><i>3. Special Inseptions as required by Section 17 04.2.5 are not required where the fabricator is approved in accordance with IBC Section 17 04.2.5.2</i></p> <p><i>4. Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.</i></p> <p><i>5. NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N7.</i></p> <p>Are Requirements for Seismic Resistance included in the Statement of Special Inspections? <b>Yes No</b></p> <p>Are Requirements for Wind Resistance included in the Statement of Special Inspections? <b>Yes No</b></p> <p style="text-align: right;">DATE:</p> |         |               |

**END OF SECTION**



**SECTION 01 4100 - REGULATORY REQUIREMENTS****PART 1 GENERAL****1.01 SUMMARY OF REFERENCE STANDARDS**

- A. Regulatory requirements applicable to this project are the following:
  - 1. Barrier Free Code: Comply with the following:
    - a. Michigan Building Code; 2015.
    - b. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
  - 2. School Fire Safety Rules: Michigan School Fire Safety Rules; 2016.
    - a. Includes NFPA 101-2012 - Life Safety Code; 2012, plus amendments.
  - 3. Building Code: Michigan Building Code; 2015.
  - 4. Plumbing Code: Michigan Plumbing Code; 2015.
  - 5. Mechanical Code: Michigan Mechanical Code; 2015.
  - 6. Electrical Code: NFPA 70 - National Electric Code; 2017.
    - a. Includes 2017 Michigan Construction Code - Part 8 Electrical Code Rules.
  - 7. Elevator Code: Comply with the following:
    - a. ASME A17.1 - Safety Code for Elevators and Escalators; 2010.
    - b. ASME A18.1- Safety Standard for Platform Lifts and Stairway Chairlifts; 2011.
    - c. Michigan Elevator Safety Board General Rules.
  - 8. Boiler Code: Michigan Boiler Code.
    - a. Includes the following:
      - 1) ASME Boiler and Pressure Vessel Codes; 2010, plus 2011 addenda.
      - 2) National Board Inspection Code; 2011.
      - 3) PA 407 Skilled Trades Regulation Act; 2016.
  - 9. Energy Code: Michigan Energy Code; 2015.
    - a. Includes ASHRAE Std 90.1 I-P-2013- Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013.
  - 10. Existing Building Code: Michigan Rehabilitation Code; 2015.
- B. Where specification sections reference more current standards or codes, comply with the more restrictive requirements unless notified in writing by Architect.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION - NOT USED****END OF SECTION**



**SECTION 01 4216 - DEFINITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

**1.02 DEFINITIONS**

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- E. Provide: To furnish and install.
- F. Supply: Same as Furnish.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 4219 - REFERENCE STANDARDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Requirements relating to referenced standards.

**1.02 QUALITY ASSURANCE**

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION -- NOT USED**

**END OF SECTION**



**SECTION 01 4533 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Code-required special inspections.
- B. Submittals.

**1.02 ABBREVIATIONS AND ACRONYMS**

- A. AHJ: Authority having jurisdiction.
- B. NIST: National Institute of Standards and Technology.

**1.03 DEFINITIONS**

- A. Code or Building Code: Michigan Building Code; 2015, specifically Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
  - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
  - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

**1.04 REFERENCE STANDARDS**

- A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
  - 1. Submit agency name, address, and telephone number, names of full time specialist and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- C. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of special inspection.
    - h. Date of special inspection.
    - i. Results of special inspection.
    - j. Compliance with Contract Documents.

2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- D. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to AHJ.
  1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of fabricated item and specification section.
    - f. Location in the Project.
    - g. Results of special inspection.
    - h. Verification of fabrication and quality control procedures.
    - i. Compliance with Contract Documents.
    - j. Compliance with referenced standard(s).
- E. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
  1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test or inspection.
    - h. Date of test or inspection.
    - i. Results of test or inspection.
    - j. Compliance with Contract Documents.

#### **1.06 SPECIAL INSPECTION AGENCY**

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

#### **1.07 QUALITY ASSURANCE**

- A. Special Inspection Agency Qualifications:
  1. Independent firm specializing in performing testing and inspections of the type specified in this section.

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

### **PART 3 EXECUTION**

#### **3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL**

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
  1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
  2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.



**3.02 SPECIAL INSPECTIONS**

- A. Special inspections and testing shall be for materials, installation, fabrication, erection or placement of components and connections as indicated on Drawings, but not less than that required by the building code.

**END OF SECTION**



**SECTION 01 6000 - PRODUCT REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Re-use of existing products.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Procedures for Owner-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 SUBMITTALS**

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS****2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
  - 1. Refer to Drawings and Section 02 4100 - Demolition.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.

**2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Available Products: Products specified by naming one or more Manufacturers as an Available Product indicates that these Manufacturers' products may be provided but other comparable products and Manufacturers not named may also be provided without submitting a request for substitution.

**2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

**PART 3 EXECUTION****3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 01 2500 - Substitution Procedures.

**3.02 OWNER-SUPPLIED PRODUCTS**

- A. Owner's Responsibilities:
  - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  - 2. Arrange and pay for product delivery to site.
  - 3. On delivery, inspect products jointly with Contractor.
  - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
  - 1. Review Owner reviewed shop drawings, product data, and samples.
  - 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
  - 3. Handle, store, install and finish products.
  - 4. Repair or replace items damaged after receipt.

**3.03 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

**3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.

- I. Do not store products directly on the ground.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**



**SECTION 02 4120 – SELECTIVE DEMOLITION****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Demolition and removal of selected portions of a building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Repair procedures for selective demolition operations.
- B. Related Sections include the following:
  - 1. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
  - 2. Division 23 Sections for demolishing, cutting, patching, or relocating mechanical items.
  - 3. Division 26 Sections for demolishing, cutting, patching, or relocating electrical items.

**1.03 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

**1.04 MATERIALS OWNERSHIP**

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

**1.05 SUBMITTALS**

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

- C. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Locations of temporary partitions and means of egress.
  - 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### **1.06 QUALITY ASSURANCE**

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

#### **1.07 PROJECT CONDITIONS**

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.



1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
  1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  1. Hazardous materials will be removed by Owner before start of the Work.
  2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  1. Maintain fire-protection facilities in service during selective demolition operations.

## **1.08 WARRANTY**

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
  1. If possible, retain original Installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.
    - a. Ornamental metal.
    - b. Preformed metal panels.
    - c. Roofing.
    - d. Firestopping.
    - e. Window wall system.
    - f. Terrazzo.
    - g. Finished wood flooring.
    - h. Swimming pool finishes.
    - i. HVAC enclosures, cabinets, or covers.

## **PART 2 PRODUCTS**

### **2.01 REPAIR MATERIALS**

- A. Use repair materials identical to existing materials.
  1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
  2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that utilities have been disconnected and capped.

- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.02 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
  - 1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
  - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
  - 5. Refer to Divisions 23 and 26 for other applicable requirements and limitations.

### 3.03 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
  - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
  - 3. Protect existing site improvements, appurtenances, and landscaping to remain.

4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- D. Temporary Enclosures: Provide temporary enclosures for protection of existing building and 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 not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.

### **3.04 POLLUTION CONTROLS**

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
  1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
  2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

### **3.05 SELECTIVE DEMOLITION**

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
    - a. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly.
  10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
  11. Explosives: Use of explosives is not permitted.
- B. Existing Facilities: Comply with building manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- C. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area on-site .
  5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

- F. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- G. Structural Steel: Dismantle field connections without bending or damaging steel members. Do not use flame-cutting torches unless otherwise authorized by Architect.
  - 1. Transport steel trusses and joists as whole units without dismantling them further.
- H. Below-Grade Construction: Demolish in sections. Remove below-grade construction, including basements, foundation walls and footings, completely to at least 12 inches below grade unless otherwise indicated on Drawings.
- I. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- J. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- K. Building Components: Remove metal gratings, metal ladders, doors, windows, door hardware, cabinets, mirrors, chalkboards and marker boards, tackboards, toilet accessories, plumbing fixtures, and light fixtures, as whole units, intact and undamaged.
- L. Elevators: Remove as whole units as much as practical.
- M. Equipment: Disconnect equipment at nearest fitting connection to services, complete with service valves. Remove as whole units, complete with controls.
- N. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.
- O. Carpet and Pad: Remove in large pieces and roll tightly after removing demolition debris, trash, adhesive, and tack strips.
- P. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
  - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- Q. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
- R. Existing Utilities: Unless otherwise indicated on Drawings, demolish existing utilities and below-grade utility structures that are within 5 feet (1.5 m) outside of footprint indicated for new construction. Abandon utilities outside this area.
  - 1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Division 2 Section "Earthwork."
  - 2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
  - 3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

### **3.06 PATCHING AND REPAIRS**

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

- B. Patching: Comply with Division 1 Section "Cutting and Patching."

### **3.07 DISPOSAL OF DEMOLISHED MATERIALS**

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

### **3.08 SELECTIVE DEMOLITION SCHEDULE**

- A. Existing Items and Construction to Be Removed: As indicated on Drawings.
- B. Existing Items to Be Removed and Salvaged: As indicated on Drawings.
- C. Existing Items to Be Removed and Reinstalled: As indicated on Drawings.
- D. Existing Items to Remain: As indicated on Drawings

**END OF SECTION**

**SECTION 04 2000 - UNIT MASONRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete block.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Lintels.
- E. Accessories.
- F. Products installed under this section:
  - 1. Precast architectural concrete units set in masonry; furnished by Section 03 4500 - Precast Architectural Concrete.
  - 2. Loose steel lintels in unit masonry; furnished by Section 05 5000 - Metal Fabrications.

**1.02 REFERENCE STANDARDS**

- A. ACI 315 - Guide to Presenting Reinforcing Steel Design Details; 2018.
- B. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber 2020.
- C. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications 2018.
- D. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2019.
- E. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2020a.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2021.
- H. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- I. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
- J. ASTM C150/C150M - Standard Specification for Portland Cement 2021.
- K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- L. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale) 2021.
- M. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- N. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- O. ASTM C476 - Standard Specification for Grout for Masonry 2020.
- P. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- Q. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2019.
- R. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- S. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2021.
- T. ASTM C 1329 - Standard Specification for Mortar Cement - 2016.
- U. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2019a.
- V. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017.

- W. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry 2020.
- X. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- Y. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- Z. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Product Coordination and Limitations: Provide products that when combined with materials and components of other sections, form exterior wall assemblies as detailed on Drawings, that comply with NFPA 285 testing and acceptance criteria.

### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for the following:
  - 1. Masonry Units:
    - a. Include data on material properties.
    - b. Masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include name of manufacturer, brand name and type.
  - 3. Mortar admixtures.
  - 4. Preblended, dry mortar mixes. Include description of type and proportion of ingredients.
  - 5. Grout mixes. Include description of type and proportion of ingredients.
  - 6. Sound Isolating anchors.
  - 7. Anchors, ties, weep/cavity vent, preformed control-joint gaskets, cavity drainage material, and metal accessories.
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for masonry.
  - 1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special units.
  - 2. Reinforcing: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars.
    - a. Comply with ACI 315.
  - 3. Flashings: Provide details of embedded flashings including end dams, corners, drips, weeps.
- D. 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 C91/C 91M for air content.
  - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirements.
- E. Samples: Submit 3 samples of standard block, decorative block, facing brick, ceramic glazed facing brick, and ceramic glazed structural clay facing tile units to illustrate color, texture, and extremes of color range.
- F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- G. Test Reports:
  - 1. Concrete masonry manufacturer's test reports for units with integral water repellent admixture.
  - 2. Masonry Veneer Anchors: At wall cavities greater than 4-1/2 inches, provide masonry veneer anchor manufacturer's test reports indicating compliance with TMS 402/602 for lateral load requirements; wall cavity depth includes airspace and cavity wall insulation thickness.



- H. NFPA 285 Documentation: For each product, submit documentation listing compatible materials and components that when used together in wall assemblies as detailed on Drawings, comply with NFPA 285 testing and acceptance criteria.
- I. Manufacturer's Qualification Statement.
- J. Installer's Qualification Statement.
- K. Cold-Weather and Hot-Weather Procedures: Detail description of methods, material, and equipment to be used to comply with requirements.

#### **1.05 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Fire Rated Assemblies: Comply with applicable codes and UL Assembly Numbers indicated.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum 5 years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least 5 years of documented experience.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Store masonry units on elevated platforms in a dry location. If units are not stored in a enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- 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.
- F. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

#### **1.07 FIELD CONDITIONS**

- A. Protection of Masonry: During construction, cover tops of walls, protections, and sills with waterproof sheeting at end of each days's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
  - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe, and hold cover 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 (4 deg C) 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**

### **2.01 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 (6 m) 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.

### **2.02 CONCRETE MASONRY UNITS (CMU)**

- A. Concrete Block: Comply with referenced standards and as follows:
  1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
  2. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
  3. Exposed Outside Block Corners: Provide bullnose, radiused, corners unless otherwise indicated on Drawings.
    - a. Field-ground radiused corners are not permitted.
    - b. Stop bullnose at bulkhead/soffits.
    - c. Provide square corners at door frame even with block and bullnose where door frame is set back from corner.
  4. Load-Bearing and Non-Loadbearing Units: ASTM C90, normal weight.
    - a. Standard Units:
      - 1) Exposed Faces: Manufacturer's standard color and texture as approved by Architect per ASTM C90.
      - 2) Manufacturers:
        - (a) Consumers Concrete Corp.: [www.consumersconcrete.com](http://www.consumersconcrete.com).
        - (b) Echelon by Oldcastle: [www.echelonmasonry.com](http://www.echelonmasonry.com).
        - (c) Fendt Builder's Supply, Inc.: [www.fendtproducts.com](http://www.fendtproducts.com).
        - (d) Grand Blanc Cement Products: [www.grandblancementproducts.com](http://www.grandblancementproducts.com).
        - (e) Michigan Certified Products, Inc.: [www.micertconcrete.com](http://www.micertconcrete.com).
        - (f) National Block Company: [www.nationalblock.com](http://www.nationalblock.com).
        - (g) Substitutions: See Section 01 6000 - Product Requirements.
    5. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.

- a. Locations: Provide at exposed exterior concrete block and elsewhere as indicated.
- b. Performance of Units with Integral Water Repellent:
  - 1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
    - (a) No water visible on back of wall above flashing at the end of 24 hours.
    - (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
    - (c) No more than 25 percent of wall area above flashing visibly damp at end of test.
  - 2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
  - 3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
  - 4) Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
- c. Limitations:
  - 1) Use only in combination with mortar containing integral water repellent admixture.
  - 2) Source Limitations: Use water repellent admixtures for masonry units and mortar from a single manufacturer.
- d. Products:
  - 1) BASF Corp.; MasterPel 240: [www.master-builders-solutions.basf.us](http://www.master-builders-solutions.basf.us).
  - 2) Euclid Chemical Company (The); an RPM company; Eucon Blocktite Admixture: [www.euclidchemical.com](http://www.euclidchemical.com).
  - 3) GCP Applied Technologies Inc.; Dry-Block Block Admixture: [www.gcpat.com](http://www.gcpat.com).
  - 4) Substitutions: See Section 01 6000 - Product Requirements.

### 2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M.
- B. Mortar Cement: ASTM C1329.
- C. Portland Cement: ASTM C150/C150M, Type I.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Mortar Aggregate: ASTM C144.
- F. Grout Aggregate: ASTM C404.
- G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
  - 1. Color(s): 94X.
  - 2. Manufacturers:
    - a. Davis Colors: [www.daviscolors.com](http://www.daviscolors.com).
    - b. Lambert Corporation: [www.lambertusa.com](http://www.lambertusa.com).
    - c. Solomon Colors: [www.solomoncolors.com/sle](http://www.solomoncolors.com/sle).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
- H. Water: Clean and potable.
- I. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
  - 1. Locations: Provide at exposed exterior concrete block and elsewhere as indicated.
  - 2. Limitations:
    - a. Use only in combination with masonry units manufactured with integral water repellent admixture.
    - b. Source Limitations: Use water repellent admixtures for masonry units and mortar from a single manufacturer.
  - 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
  - 4. Products:
    - a. BASF Corp.; MasterPel 210MA: [www.master-builders-solutions.basf.us](http://www.master-builders-solutions.basf.us).

- b. Euclid Chemical Company (The); an RPM company; Blocktite Mortar Admixture: [www.euclidchemical.com](http://www.euclidchemical.com).
  - c. GCP Applied Technologies Inc.; Dry-Block Mortar Admixture: [www.gcpat.com](http://www.gcpat.com).
  - d. Substitutions: See Section 01 6000 - Product Requirements.
- J. Packaged Dry Material for Mortar for Unit Masonry:
  - 1. At Contractor's option, prepackaged dry material for mortar may be used subject to compliance with mortar requirements of this section including, but not limited to, the following:
    - a. Mortar Types: As indicated.
    - b. Color(s): As selected by Architect from manufacturer's full range.
    - c. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
  - 2. Portland Cement Based: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
    - a. Manufacturers:
      - 1) Amerimix, an Oldcastle brand; [www.amerimix.com](http://www.amerimix.com).
      - 2) The QUIKRETE Companies; [www.quikcrete.com](http://www.quikcrete.com).
      - 3) SPEC MIX, Inc.; [www.specmix.com](http://www.specmix.com).
      - 4) Substitutions: See Section 01 6000 - Product Requirements.
  - 3. Masonry Cement Based: Premixed masonry cement and mason's sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
    - a. Manufacturers:
      - 1) Amerimix, an Oldcastle brand; [www.amerimix.com](http://www.amerimix.com).
      - 2) The QUIKRETE Companies; [www.quikcrete.com](http://www.quikcrete.com).
      - 3) SPEC MIX, Inc.; [www.specmix.com](http://www.specmix.com).
      - 4) Substitutions: See Section 01 6000 - Product Requirements.
- K. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
  - 1. At Contractor's option, prepackaged dry material for grout may be used subject to compliance with grout requirements of this section.
  - 2. Manufacturers:
    - a. Amerimix, an Oldcastle brand; [www.amerimix.com](http://www.amerimix.com).
    - b. The QUIKRETE Companies; [www.quikcrete.com](http://www.quikcrete.com).
    - c. SPEC MIX, Inc.; [www.specmix.com](http://www.specmix.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.

## **2.04 REINFORCEMENT AND ANCHORAGE**

- A. Manufacturers:
  - 1. Basis-of-Design Product: The design for each item specified is based on the product named. Provide either the named product or a comparable product by one of the following:
    - a. Fero Corp.; [www.ferocorp.com](http://www.ferocorp.com).
    - b. Heckmann Building Products; [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - c. Hohmann & Barnard, Inc.; [www.h-b.com](http://www.h-b.com).
    - d. Wire-Bond; [www.wirebond.com](http://www.wirebond.com).
    - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; galvanized.
- C. Reinforcing Bar Positioners: 0.156 inch, ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to 16 CFR 1201 Class B.

1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: RB and RB-Twin Rebar Positioners.
- D. Reinforcing Bar Lap Joint Ties: ASTM A1064/A1064M steel wire, mill galvanized to 16 CFR 1201 Class 3.
  1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: Spyra-Lox Rebar Lap-Joint Tie.
- E. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to 16 CFR 1201 Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
  1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: 120 Truss-Mesh or 220 Ladder-Mesh.
- F. Adjustable Multiple Wythe Joint Reinforcement: Truss or ladder type with adjustable ties or tabs spaced at 16 in on center ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
  1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: 170 Truss LOX-ALL Adjustable Eye Wire or 270 Ladder LOX-ALL Adjustable Eye Wire with 2X-HOOK.
- G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches; hot dip galvanized to ASTM A153/A153M Class B.
  1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: 344 Rigid Partition Anchor.
- H. Partition Top Anchors: 0.1875 inch thick metal plate with a 3/8 inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube; hot dip galvanized to ASTM A153/A153M Class B.
  1. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: PTA-420-HS and PTA Tubes.
- I. Dovetail Anchor Slots for Connecting to Concrete: 2-piece anchors that permit differential movement between masonry and concrete frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
  1. Concrete frame: Dovetail anchors of bent steel, nominal 1 inch width by 1 inch deep by 0.03 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
    - a. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: 305 Dovetail Slot with 315 Flexible Dovetail Brick Ties.
- J. Adjustable Anchors for Connecting to Structural Steel Framing: 2-piece anchors that permit differential movement between masonry and steel frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
  1. Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
  2. Basis-of-Design Product: Hohmann & Barnard, Inc.; www.h-b.com: 359/359FP anchors with 301W or VBT ties.
- K. Adjustable Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
  1. For cold-formed metal framing and sheathing back-up.
  2. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
  3. Wire ties: Rectangular shape, 0.1875 inch thick.

4. Vertical adjustment: Not less than 2 inches.
  5. Basis-of-Design Product: Hohmann & Barnard, Inc.; [www.h-b.com](http://www.h-b.com): HB-213 anchors with 2X-HOOK.
- L. Sound Isolating Anchors.
1. Provide as indicated on the Drawings.
    - a. Basis of Design Product: Provide PSB-M isolators as manufactured by Kinetics. Texture Wire cut or as follows:
      - 1) Mason Industries AB-716.

## 2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints. ASTM D2000, 2AA-805.
1. Manufacturers:
    - a. Hohmann & Barnard, Inc: [www.h-b.com/sle](http://www.h-b.com/sle).
    - b. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
    - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Compressible Joint Filler: Closed cell neoprene; oversized 50 percent to joint width; self expanding; in maximum lengths available. ASTM D1056, Grade 2A1.
1. Manufacturers:
    - a. Hohmann & Barnard, Inc: [www.h-b.com/sle](http://www.h-b.com/sle).
    - b. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
    - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Masonry Cleaners:
1. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
    - a. Basis-of-Design Products: Provide PROSOCO, Inc.; [www.prosoco.com](http://www.prosoco.com): Sure Klean 600 or Sure Klean Vana Trol or a comparable product by one of the following:
      - 1) Diedrich Technologies, Inc.; [www.diedrichtechnologies.com](http://www.diedrichtechnologies.com).
      - 2) Substitutions: See Section 01 6000 - Product Requirements.

## 2.06 LINTELS

- A. Masonry Lintels: Masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and weight classification; reinforcing bars as indicated, and filled with grout.
- B. Loose Steel Lintels: Refer to Section 05 5000 - Metal Fabrications.

## 2.07 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
1. Masonry below grade and in contact with earth: Type M.
  2. Exterior, loadbearing masonry: Type S.
  3. Exterior, non-loadbearing masonry: Type N.
  4. Interior, loadbearing masonry: Type N.
  5. Interior, non-loadbearing masonry: Type N.
  6. Precast concrete units: Same Type as wall masonry in which unit is set.
  7. Limestone units: Same Type as wall masonry in which unit is set.
  8. Pointing Mortar: Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
1. Brick Mortar Color: 85X Dark Chocolate.
- C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

1. Grout Strength: 3000 psi at 28 days, unless otherwise indicated.
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. Mixing: Use mechanical batch mixer and comply with referenced standards.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that foundations are within tolerances specified.
- C. Verify that related items provided under other sections are properly sized and located.
- D. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- E. Verify that reinforcing dowels are properly placed.

#### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

#### **3.03 INSTALLATION, GENERAL**

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. 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.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

#### **3.04 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Existing Masonry: Match coursing and bonding of existing masonry unless otherwise indicated.
- D. Concrete Masonry Units: Unless otherwise indicated:
  1. Bond: Running.
  2. Coursing: One unit and one mortar joint to equal 8 inches.
  3. Mortar Joints: Concave.
  4. Mortar Joint Thickness: 3/8 inch.
- E. Brick Units: Unless otherwise indicated:
  1. Bond: Running.
  2. Coursing: Three units and three mortar joints to equal 8 inches.
  3. Mortar Joints: Concave.
  4. Mortar Joint Thickness: 3/8 inch.

#### **3.05 PLACING AND BONDING**

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.

- D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- E. Interlock intersections and external corners.
- F. Tooth-in new masonry work with existing, unless otherwise indicated on Drawings.
- G. Tooth-in cutting and patching masonry work unless otherwise indicated on Drawings.
- H. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- I. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- J. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- L. Isolate cast stone units and precast architectural concrete units from clay masonry with building paper or similar method of providing a continuous bond break/slip plane.
- M. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  - 2. Allow cleaned surfaces to dry before setting.
  - 3. Wet joint surfaces thoroughly before applying mortar.
  - 4. Rake out mortar joints for pointing with sealant.

### **3.06 HORIZONTAL JOINT REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY AND CAVITY WALL MASONRY**

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Masonry to Structural Steel and Concrete:
  - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 24 inches horizontally and 24 inches vertically.
- F. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

### **3.07 LINTELS**

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel lintels are not scheduled.
  - 1. Unless otherwise indicated, reinforce as follows:
    - a. Openings to 48 inches: Place two, No. 4 reinforcing bars 1 inch from bottom web.
    - b. Openings from 48 inches to 80 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
    - c. Openings over 80 inches: Reinforce openings as detailed.
  - 2. Do not splice reinforcing bars.



3. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
4. Place and consolidate grout fill without displacing reinforcing.
5. Allow masonry lintels to attain specified strength before removing temporary supports.
- C. Where the Drawings do not indicate otherwise, provide reinforced unit masonry lintels at all openings and penetrations wider than 12 inches in brick and 24 inches in CMU.
- D. Maintain minimum 8 inch bearing on each side of opening unless otherwise indicated.

### **3.08 BOND BEAMS**

- A. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.
- B. Reinforce bond beams with 2, No. 5 bars, 1 inch from bottom web unless otherwise indicated.
- C. Lap reinforcing bar splices minimum 24 bar diameters, unless otherwise indicated.
- D. Place and consolidate grout fill without displacing reinforcing.

### **3.09 VERTICAL MASONRY REINFORCEMENT**

- A. Reinforcement: Size and place vertical masonry reinforcement to comply with TMS 402/602 requirements and as indicated on Drawings.
- B. Place and consolidate grout fill without displacing reinforcing.

### **3.10 GROUTING**

- A. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
- B. Perform grouting by means of high-lift technique, except in locations that mandate use of low-lift grouting technique.
  1. Do not use high-lift grouting where size of cavities mandates use of fine grout.
- C. Low-Lift Grouting:
  1. Limit height of pours to 12 inches.
  2. Limit height of masonry to 16 inches above each pour.
  3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
  4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- D. High-Lift Grouting:
  1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
  2. Clean out masonry cells and other cavities to be grouted by high pressure water spray or compressed air. Remove debris, allow to dry, and inspect before sealing cleanout openings.
  3. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
  4. Place grout for spanning elements in single, continuous pour.

### **3.11 GROUTED COMPONENTS**

- A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- B. Place and consolidate grout fill without displacing reinforcing.
- C. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

### **3.12 CONTROL AND EXPANSION JOINTS**

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
  1. Refer to Section 07 9200 - Joint Sealants for sealant installation.

**3.13 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames, glazed frames, anchor bolts, plates, and reglets and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

**3.14 TOLERANCES**

- A. Dimensions and Locations of Elements:
  - 1. Location of elements in plan; do not vary from that indicated on Drawings by more than:
    - a. Plus or minus 1/2 inch.
  - 2. Dimensions in cross section; do not vary from that indicated on Drawings by more than:
    - a. Minus 1/4 inch.
    - b. Plus 1/2 inch.
- B. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- H. Lines and Levels:
  - 1. Maximum variation from level:
    - a. Includes, but is not limited to, the following:
      - 1) Lintels.
      - 2) Sills.
      - 3) Parapets.
      - 4) Reveals.
      - 5) Other conspicuous lines.
    - b. Do not vary from level by more than:
      - 1) 1/4 inch in 20 feet.
      - 2) 1/2 in in 40 feet or more.
  - 2. Maximum variation from plumb:
    - a. Includes, but is not limited to, the following:
      - 1) External corners.
      - 2) Control and expansion joints.
      - 3) Reveals.
      - 4) Other conspicuous lines.
    - b. Do not vary from plumb by more than:
      - 1) 1/4 inch in 20 feet.
      - 2) 1/2 in in 40 feet or more.
- I. Mortar Joint Thickness: Do not vary thickness indicated by more than plus or minus 1/8 inch.

**3.15 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

**3.16 CLEANING**

- A. Protect surrounding elements and finishes from damage due to cleaning procedures.
- B. Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 10 feet away, subject to Architect's approval.
- C. Remove excess mortar and mortar droppings.

- D. Clean soiled surfaces with cleaning solution.
- E. Apply masonry cleaners to masonry surfaces according to manufacturer's written instructions; use brush or spray application.
  - 1. Periodically during rinsing, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
    - a. Repeat rinsing until tested pH of water runoff is between 6.7 and 7.5.
- F. Ground-Face CMU: Refer to Section 09 9100 - Painting for field applied sealer.

**END OF SECTION**



## **SECTION 05 1200 - STRUCTURAL STEEL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Structural steel.
  - 2. Grout.
- B. Related Requirements:
  - 1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

#### **1.2 DEFINITIONS**

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

#### **1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
- C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer and fabricator.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Source quality-control reports.
- E. 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, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. 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."

#### **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.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using schematic details indicated and AISC 360.
- B. Moment Connections: Fully restrained.
- C. Construction: Combined system of moment frame, braced frame, and shear walls.

### **2.2 STRUCTURAL-STEEL MATERIALS**

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

### **2.3 BOLTS, CONNECTORS, AND ANCHORS**

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Plain.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Finish: Plain.
- E. Threaded Rods: ASTM A 36/A 36M.
  - 1. Finish: Plain.

### **2.4 PRIMER**

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

### **2.5 GROUT**

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

### **2.6 FABRICATION**

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. 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/D1.1M and manufacturer's written instructions.

### **2.7 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/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

### **2.8 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 of high-strength bolted, slip-critical connections.
  4. 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 2, "Hand Tool Cleaning."
  2. SSPC-SP 3, "Power Tool Cleaning."
  3. SSPC-SP 7/NACE No. 4, "Brush-off Blast 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.

## **2.9 SOURCE QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M 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 are not accepted.
  3. Ultrasonic Inspection: ASTM E 164.
  4. Radiographic Inspection: ASTM E 94.
- D. Prepare test and inspection reports.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify, with certified 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 ERECTION**

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling 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 303, "Code of Standard Practice for Steel Buildings and Bridges."

### **3.3 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: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M 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 maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

### **3.4 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
  - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, test and inspect field welds 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 are not accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.

**END OF SECTION**



**SECTION 06 4023 – INTERIOR ARCHITECTURAL WOODWORK****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Solid-surfacing-material window sills.
- B. Related Sections include the following:
  - 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

**1.3 DEFINITIONS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors 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. Include chemical-treatment manufacturer's written instructions for finishing treated material.
  - 2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
  - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
  - 4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- C. Samples for Verification:
  - 1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.
- B. Sample Warranty: For manufacturer's warranty.

### **1.6 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance
- B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and wood doors with face veneers that are sequence matched with woodwork.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
  1. Provide AWI Quality Certification Program labels indicating that woodwork complies with requirements of grades specified.
- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

### **1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
  - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## **1.9 COORDINATION**

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty for Columns: Manufacturer agrees to repair or replace columns that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Columns: **Five (5)** years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 WOODWORK FABRICATORS**

- A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

### **2.2 MATERIALS**

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Grade: Premium AA
- C. Wood Species and Cut for Transparent Finish: Red oak, rift sawn
- D. Wood Species for Opaque Finish: Any closed-grain hardwood
- E. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
  - 3. Particleboard: ANSI A208.1, Grade M-2

4. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
  5. Softwood Plywood: DOC PS 1
  6. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avonite, Inc.
    - b. E. I. du Pont de Nemours and Company.
    - c. Formica Corporation.
    - d. Wilsonart International; Div. of Premark International, Inc.
    - e. L.G. Hi'Macs Co.
  2. Type: Standard type unless Special Purpose type is indicated.
  3. Colors and Patterns: As selected by Architect from manufacturer's full range .

## **2.3 MISCELLANEOUS MATERIALS**

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. Wood Glues: 30 g/L.
  2. Contact Adhesive: 250 g/L.
- E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement
  1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## **2.4 FABRICATION, GENERAL**

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of openings in countertops with a coat of varnish.

## **2.5 SOLID-SURFACING-MATERIAL WINDOW SILLS**

- A. Grade: Premium
- B. Solid-Surfacing-Material Thickness: 1/2 inch (12.7 mm).
- C. Colors, Patterns, and Finishes:
  - 1. Architect to select one (1) color from manufacturer's full range of color, from all price groups.
- D. Fabricate in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

## **2.6 SHOP FINISHING**

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.
- D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing architectural woodwork not indicated to be shop finished.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

### **3.2 INSTALLATION**

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Window Sills:
  - 1. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
  - 2. Install sills with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 3. Calk space between sill and window frame with sealant specified in Division 7 Section "Joint Sealants."

### **3.3 ADJUSTING AND CLEANING**

- A. Repair damaged and defective work, where possible, to eliminate functional and visual defects; where not possible to repair, replace work. Adjust joinery for uniform appearance.

### **END OF SECTION**

**SECTION 07 9200 - JOINT SEALANTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes joint sealants for the following locations:
  - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
    - a. Control and expansion joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Joints of stonework set without mortar.
    - d. Joints between different materials listed above.
    - e. Perimeter joints between materials listed above and frames of doors and windows.
    - f. Control and expansion joints in ceiling and overhead surfaces.
    - g. Other joints as indicated.
  - 2. Exterior joints in horizontal traffic surfaces as indicated below:
    - a. Control and expansion joints in brick pavers.
    - b. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    - c. Tile control and expansion joints.
    - d. Joints between different materials listed above.
    - e. Other joints as indicated.
  - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings where indicated.
    - c. Tile control and expansion joints.
    - d. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    - f. Perimeter joints of toilet fixtures.
    - g. Other joints as indicated.
  - 4. Interior joints in horizontal traffic surfaces as indicated below:
    - a. Control and expansion joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated.

**1.3 SYSTEM PERFORMANCE REQUIREMENTS**

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.
- C. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
  - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  - 2. Conduct field tests for each application indicated below:
    - a. Each kind of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
  - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
    - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittals:
  1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
  2. Laboratory Test Reports for Credit IEQ 4: For sealants and sealant primers used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- E. Joint-Sealant Schedule: Include the following information:
  1. Joint-sealant application, joint location, and designation.
  2. Joint-sealant manufacturer and product name.
  3. Joint-sealant formulation.
  4. Joint-sealant color.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction 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.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.



**1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

**1.7 DELIVERY, STORAGE, AND HANDLING**

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

**1.8 PROJECT CONDITIONS**

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

**1.9 SEQUENCING AND SCHEDULING**

- A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

**1.10 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: 20 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  2. Disintegration of joint substrates from natural causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

**PART 2 - PRODUCTS****2.1 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

**2.2 ELASTOMERIC JOINT SEALANTS**

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
- B. Products: Subject to compliance with requirements, provide one of the products specified in each Elastomeric Joint Sealant Data Sheet.
- C. GLAZING SEALANT shall be Dow Corning silicone sealant No. 795 or Tremco "Spectrem 2" or General Electric "Silglaze", in a standard color designated by the Architect.
- D. CONSTRUCTION SEALANT shall be Tremco "Spectrem 3" silicone Type S, Grade-NS. Class 50 or approved equal from Dow Corning or General Electric, in standard color designated by architect.
- E. ACRYLIC LATEX SEALANT shall be one-part conforming to ASTM C-834-76 as manufactured by TREMCO "Tremflex 834", PECORA or PTI. Color shall be selected by the Architect from standard colors. This material shall be used at interior areas around windows, doors, frames, precast concrete slabs, and interior masonry walls.
- F. ACOUSTICAL SEALANT shall conform to ASTM-D-217 and be a synthetic rubber base, as manufactured by TREMCO. This material shall be used wherever interior partitions butt up against exterior walls or drywall ceilings.
- G. ON-GRADE JOINT SEALANT shall be one or two-part, self-leveling pouring grade polyurethane as manufactured by Tremco THC 900/901", Pecora "NR-200", Sonaborn SL-2 or Master Mechanics "Vulkem #245".

**2.3 JOINT SEALANT BACKINGS**

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  - 1. Open-cell polyurethane foam.
  - 2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
  - 3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gms/cc per ASTM C 1083.
  - 4. Any material indicated above.
- C. PRIMER: Provide type as recommended by the sealant manufacturer for the varied joint surfaces.

**2.4 COMPRESSION SEALS**

- A. Performed Foam Sealant: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellant agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to degree specified by manufacturer. Provide products which are permanently elastic, mildew-resistant, non-migratory, nonstaining, compatible with joint substrates and other joint sealers, and comply with the following requirements:
  - 1. Impregnating Agent: Neoprene rubber suspended in chlorinated.
  - 2. Density: 9-10 lb./cu. ft.
  - 3. Backing: Pressure sensitive adhesive, factory applied to one side, with protective wrapping.
  - 4. Color: Manufacturers standard gray at building expansion joint, black at all other locations.
  - 5. Acceptable Manufacturers/Products: Subject to compliance with requirements, provide one of the following or approved equal:
    - a. [Dayton Superior Specialty Chemicals](#); Polytite Standard.

- b. [EMSEAL Joint Systems, Ltd.](#); Emseal 25V.
- c. [Sandell Manufacturing Co., Inc.](#); Polyseal.
- d. [Schul International, Inc.](#); Sealtite
- e. [Willseal USA, LLC](#); Willseal 150

## 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - APPLICATION

### 3.1 SEALANT TYPE DETERMINATION

- A. USE EXTERIOR CONSTRUCTION SEALANT at above-grade exterior joints. Use same sealant at interior side of joint if exterior material is the same through the wall, such as a metal frame or single-wythe block wall.
- B. USE INTERIOR ACRYLIC LATEX SEALANT at all other above-grade interior joints, such as at interior hollow metal frames, wood, stone, brick or drywall, in any combination.
- C. USE PAVING SEALANT at all sealed joints on traffic bearing surfaces and at grade.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.
- D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 90 for use of latex sealants.

- E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 19 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- F. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers.
    - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
  - 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- G. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- H. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 62, unless otherwise indicated.
  - 2. Provide flush joint configuration, per Figure 5B in ASTM C 962, where indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
  - 3. Provide recessed joint configuration, per Figure 5C in ASTM C 962, of recess depth and at locations indicated.
- I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

### **3.4 CLEANING**

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

### **3.5 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

### **END OF SECTION**

**SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal borrowed lites glazing frames.

**1.02 ABBREVIATIONS AND ACRONYMS**

- A. ANSI: American National Standards Institute.
- B. BHMA - Builders Hardware Manufacturers Association.
- C. NFPA: National Fire Protection Association.
- D. SDI: Steel Door Institute.
- E. UL: Underwriters Laboratories.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames. 2003.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2018.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- J. ASTM C476 - Standard Specification for Grout for Masonry 2020.
- K. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- M. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- Q. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- R. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.
- S. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- 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, and any indicated finish requirements.
  - 1. Include details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 5 years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least 5 years of documented experience.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with ANSI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

#### **1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer warranty for doors and frames to be free from material or workmanship defects and within commercial tolerances within a 1 year period after Date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company; [\_\_\_\_]: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. Curries, an Assa Abloy Group company: [www.curries.com](http://www.curries.com).
  - 3. De La Fontaine: [www.delafontaine.com](http://www.delafontaine.com).
  - 4. Mesker/Mesker Openings Group, a Dormakaba Group company: [www.meskeropeningsgroup.com](http://www.meskeropeningsgroup.com).
  - 5. Pioneer Industries, an Assa Abloy Group company: [www.pioneerindustries.com](http://www.pioneerindustries.com).
  - 6. Republic Doors, an Allegion brand: [www.republicdoor.com](http://www.republicdoor.com).
  - 7. Steelcraft, an Allegion brand: [www.allegion.com](http://www.allegion.com).
  - 8. Substitutions: See Section 01 6000 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
  - 4. Door Edge Profile: Hinged edge square, and lock edge beveled.
  - 5. Typical Door Face Sheets: Flush.
  - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
  - 7. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115 and ANSI A250.8 (SDI-100) in accordance with specified requirements and as follows:
    - a. Minimum Hardware reinforcing thicknesses:
      - 1) Mortise Butt Hinges: 0.123 inches (10 gage),
      - 2) Pivot Hinges: 0.167 inches (7 gage)
      - 3) Continuous Hinges: 0.067 inches (14 gage).
      - 4) Exit Devices: 0.067 inches (14 gage)

- 5) Mortise Locksets and Deadbolts: 0.067 inches (14 gage).
- 6) Bored Locksets and Deadbolts: 0.067 inches (14 gage).
- 7) Flush and Surface Bolts: 0.067 inches (14 gage).
- 8) Closers and Hold Open Arms: 0.067 inches (14 gage).
- 9) Pull Plates and Push/Pull Bars: 0.067 inches (14 gage).
- 10) Protection Plates and Push Plates: No reinforcing required.
8. Zinc Coating: Where indicated, provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M.
  - a. Minimum A60/ZF180 (galvannealed) coating unless otherwise indicated.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### 2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire Rated:
  1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
  2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.

### 2.04 HOLLOW METAL FRAMES

- A. Hollow metal frames based on SDI Standards: ANSI A250.8 (SDI-100).
  1. Joints between faces of abutting frame members shall appear seamless; joints shall be securely welded, filled, and and finished smooth without visible seams.
- B. Frame Finish: Factory primed and field finished.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
  2. Includes frames for wood doors.
- D. Borrowed Light Frames: Full profile/continuously welded type.
  1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
  2. Face dimensions to match door frames.
- E. Mullions for Pairs of Doors: Where indicated provide fixed mullions with profile similar to jambs.
  1. Refer to Section 08 7100 - Door Hardware for removable mullions.
- F. Transom Bars: Fixed, of profile same as jamb and head.
- G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- H. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- I. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- J. Frame Anchors:
  1. Provide anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  2. Floor Anchors: Base anchors welded to bottom of frames, designed to attach frame to floor.
  3. Masonry Anchors: Masonry anchors shall be T-strap type, corrugated or perforated.

4. Stud Anchors: Z-type, welded to back of frames.
5. In-Place Concrete or Masonry Wall Anchors: Minimum 3/8 inch diameter bolts with expansion shields or inserts, with manufacturer's standard spacer.
  - a. For existing walls or new openings cut into existing walls

## **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Corrosion Resistant Back-Coating: Automotive undercoating, asphalt emulsion, or other high-build, water-resistant, resilient coating.

## **2.06 ACCESSORIES**

- A. Glazing: As specified in Section 08 8000.
- B. Removable Stops: Formed sheet steel, mitered or butted corners; prepared for countersink style tamper proof screws.
  1. At Contractor's option, instead of glass stops provided by door manufacturer, provide fire rated glass manufacturer's standard vision lite kits for installing fire-rated glass in doors.
    - a. Refer to Section 08 8000 - Glazing.
- C. Astragals for Double Doors: Specified in Section 08 7100.
  1. Fire-Rated Doors: Steel, shape as required for fire rating.
- D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
  1. Comply with requirements of Section 04 2000 - Unit Masonry.
- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Filler: Two-component, non-shrinking resin, autobody filler.
  1. Available Products:
    - a. 3M/Bondo; Professional Gold Body Filler: [www.bondo.com](http://www.bondo.com).
- G. Mineral Fiber Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread and smoke developed indexes of 0 (zero) when tested in accordance with ASTM E84.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.02 PREPARATION**

- A. Back-Coating of Non-Rated Frames: Field-apply corrosion resistant back-coatings to frames that are to be grouted solid.
  1. Do not back-coat fire-rated frames.

### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Install smoke control units in accordance with NFPA 105.
- D. Set frames accurately in position, aligned, plumb, and square.
- E. Fill head and jamb members with mineral fiber insulation prior to installation.
  1. Exception: Do not fill frames that are to be grouted solid.
- F. Grout frames solid in masonry and concrete construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
  1. Install silencers prior to grouting frames.



2. Do not grout fire-rated frames; instead fill head and jamb members with mineral fiber insulation.
- G. Frame Anchors:
  1. Coordinate frame anchor placement with wall construction.
  2. Minimum number of anchors:
    - a. Provide 3 jamb anchors per jamb up to 90 inches in height; evenly spaced.
    - b. Provide 4 jamb anchors per jamb from 90 to 144 inches in height; evenly spaced.
    - c. Provide 1 additional anchor per jamb for each 24 inches or fraction thereof more than 144 inches in height.
    - d. Provide 1 floor anchor at the bottom of each jamb or mullion; where a floor anchor is not possible provide one additional jamb anchor.
  3. In-Place Concrete or Masonry Wall Anchor: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- H. Install doors plumb with uniform clearance at jambs and head; doors shall open and close without binding
- I. Install glass in accordance with Section 08 8000 - Glazing.
- J. Install door hardware as specified in Section 08 7100.
- K. Coordinate installation of electrical connections to electrical hardware items.

**3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

**3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

**END OF SECTION**



**SECTION 08 2250 – FRP DOORS****PART 1 GENERAL****1.01 RELATED DOCUMENTS/DESCRIPTION**

- A. Drawings and General provision of Contract, including General and Supplementary Conditions and Division 01 Specification sections, are a part of this Section for the Base Bid and applicable alternates.
- B. This Section includes:
  - 1. FRP doors - provide FRP doors as specified, shown or scheduled, with components and accessories for a complete and proper installation.
  - 2. Factory glazing of FRP door lites.
  - 3. Manufacturer hardware.
  - 4. Factory installation of finish hardware.
- C. The following sections contain requirements that relate to this Section:
  - 1. Division 07 Section "Joint Sealants" for sealants and gaskets.
  - 2. Division 08 Section "Glazing" for glass and glazing.
  - 3. Division 08 Section "Door Hardware" for door hardware.
- D. System Performance:
  - 1. Provide exterior and interior doors assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
    - a. Thermal Transmittance (exterior doors): U-value of not more than 0.09 Btu/(hr x sf x Degrees F.) per AAMA 1503.1.

**1.02 QUALITY ASSURANCE**

- A. Comply with fire-resistance, flammability, regulations as interpreted by governing authorities and as follows:
  - 1. Face Sheets tested in accordance with ASTM E84-79A shall have the following ratings;  
Standard Face sheets:
    - a. Smoke Developed: not greater than 345.
    - b. Flame Spread: not greater than 145.
  - 2. Class A Face Sheets (Required on interior face of all exterior doors):
    - a. Smoke Developed not greater than 340.
    - b. Flame Spread: not greater than 15.
- B. Manufacturer Qualifications: Shall have produced fiberglass reinforced doors for at least five years.
- C. Field Measurement:
  - 1. Take field measurements prior to fabrication of doors and frames to insure proper fitting of assemblies. Successful bidders are expected to field verify all dimensions, sizes, quantities and the material required to complete this project. Failure to do so will not relieve the successful contractor from the necessity of furnishing any and all materials that may be required, without any additional cost to the Owner.

**1.03 COORDINATION**

- A. Door manufacturer shall be responsible for coordinating all necessary information from hardware supplier in order that doors shall be properly prepared to receive hardware and fit frames properly. Contractor shall provide manufacturer with copies of approved schedules necessary to complete manufacturing of doors. This information shall be in the possession of the door manufacturer 60 days prior to desired delivery date of doors.

**1.04 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
  - 1. Substitutions for products as specified MUST be submitted in accordance with Division 01. Substitute products not submitted in accordance with Division 01 Section "Product Requirements" will NOT be considered.
- B. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of FRP (fiberglass reinforced polyester) doors required for project, including test reports certifying that products have been tested and comply with performance requirements.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of FRP (fiberglass reinforced polyester) doors, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.
- D. Samples: Submit 6" samples of each type and color of FRP (fiber reinforced polyester) finish, and 12" long sections of extrusions or formed shapes. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.

**1.05 PRODUCT DELIVERY, HANDLING, AND STORAGE**

- A. All materials supplied shall be delivered to the jobsite in their original, unopened packages with labels intact. Materials shall be inspected for damage, and the manufacturer informed of any discrepancies. Unsatisfactory materials shall not be used.
- B. All materials supplied shall be packaged in individual corrugated cartons. Doors shall "floated" within cartons, with no portion of door in contact with outer shell.
- C. All doors to be marked with individual opening numbers to correlate with the designation system used on the shop drawings for doors, frames and hardware. Markings shall be temporary, removable, or concealed.

**1.06 WARRANTY**

- A. Provide written warranty signed by Manufacturer, Installer, and Contractor, agreeing to replace FRP (fiberglass reinforced polyester) doors which fail in materials or workmanship within time period indicated below of acceptance. Failure of materials or workmanship includes excessive deflections, faulty operation of entrances, and deterioration of finish or construction in excess of normal weathering.
  - 1. Time Period: Five years from date of substantial completion.
- B. Provide written warranty signed by Manufacturer guaranteeing hardware attachment of factory installed finish hardware.
  - 1. Time Period: Five years from date of substantial completion

**PART 2 PRODUCTS****2.01 ACCEPTABLE MANUFACTURERS**

- A. Manufacturer: Subject to compliance with requirements, provide SL17 FRP Flush Doors as manufactured by Special-Lite, Inc., and Aluminum Frames for FRP Doors as specified herein.

**2.02 MATERIALS AND ACCESSORIES**

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate, minimum wall thickness of 1/8".
- B. Fasteners: Aluminum, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components.
  - 1. For exposed fasteners, provide Phillips head flat head screws with finish matching item to be fastened.
- C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
  - 1. Provide manufacturer's standard reinforcement for each type of hardware required, not less than .125" thick.
  - 2. Provide manufacturer's recommended fastener reinforcement.
- D. Door Face Material: Fiberglass reinforced polyester, SpecLite 3, 0.120" minimum thickness, with pebble-like embossed finish.
  - 1. Acceptable Product: Subject to compliance with the following requirements:
    - a. Impact Strength of Face Sheets: ASTM D256, Izod Impact Strength, 13.5 footpounds per inch of notch.
    - b. Abrasion Resistance of Face Sheets: ASTM D1242, 1000 cycles of Model 503 Taber Abraser with a 1000 gram load, not to exceed 0.23% weight loss.
    - c. Hardness of Face Sheets: ASTM D2583, Barcol Meter Hardness Test, not more than 50.
    - d. Humidity Resistance of Face Sheets: ASTM D570, water absorption not greater than 0.40% after 24 hour immersion.
    - e. Ultra-Violet Degradation: Only slight color change, and negligible change in surface gloss and other physical properties after exposure to 500,000 Langleys.
- E. Weatherstripping: Provide manufacturer's standard replaceable weathering pile.
  - 1. Factory installed concealed adjustable bottom brush SL301 with double nylon brush weatherstripping.
- F. Sealants and Gaskets: Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating, and weatherproof.

**2.03 FIBERGLASS REINFORCED POLYESTER (FRP) DOORS**

- A. FRP Doors are to be constructed as follows:
  - 1. Doors are to be 1 3/4" thick.
  - 2. Constructed of aluminum alloy rails and stiles, joined with steel tie rods, and have an inner core consisting of foamed-in-place Urethane.
  - 3. Stiles to be tubular shape to accept hardware as specified.
  - 4. Top and bottom rails to be extruded with internal legs for interlocking rigid weather bar.

5. Face Sheets to be secured with extruded interlocking edges. (No snap-on trim will be accepted).
6. Joinery to be 3/8" tie rods, top and bottom, bolted through an extruded spline and 3/16" riveted reinforcing angles, and secured with hex nuts.
7. Core to be of Urethane foam of 3 pounds per cubic ft. density. All doors are to be properly reinforced for hardware prior to Urethane core foaming in door.
8. Face Sheets:
9. Fiberglass Reinforced Plastic Sheets to be polyester SpecLite 3, 0.120" thick, with pebble-like finish.
10. Pairs of Doors: Meeting stiles to beveled.
11. All doors shall be machined for finish hardware at the factory in accordance with the templates from the hardware supplier and the Approved Hardware Schedule. For surface applied hardware, doors shall have necessary reinforcement, including the attachment of RIVNUT blind bolt fasteners. With the exception of door holders, which require field application, doors are to be shipped with surface hardware factory applied.
12. Door Lites: Provide door lites factory glazed as indicated, with manufacturer's standard aluminum moldings and stops, with removable stops on inside only. Glass to be 1" insulated safety glass.

#### **2.04 ALUMINUM CAPPING SYSTEM**

- A. Where indicated, provide a Frame capping system fabricated of .062" Aluminum, as manufactured by Special-Lite, Inc. Finish capping to match finish as supplied on other framing sections.

#### **2.05 INSERT FRAMING**

- A. Where indicated, provide insert frames fabricated of extruded 6063T5 Aluminum alloy fitted with .34 inch high by .36 inch wide wool-poly-propylene blend pile. Corner joints are to be mitered and secured with prefabricated aluminum clips. Framing as manufactured by Special-Lite, Inc., and finished to match other framing sections.

#### **2.06 FINISH HARDWARE**

- A. Hardware supplied by the door manufacturer and factory installed:
  - a. Pull: Special-Lite SL-86.
  - b. Bottom brush SL301
- B. Supplier: Refer to Section 08710 of these specifications for the Finish Hardware requirements for this project. Refer to approved Finish Hardware Schedule for items to be supplied to the door and frame manufacturer to install.
- C. Receive Hardware supplied in accordance with Section 08710, and Hardware Schedule, and coordinate with the Hardware requirements of this section. Report discrepancies (in writing) to the Architect immediately.
- D. Ship hardware, to be installed by manufacturer, to manufacturer with cartons marked with door numbers correlating with designation system used on shop drawings.
- E. Install all Hardware, except door holders at the fabrication plant. Remove only Hardware as required for final finishing or delivery to jobsite. Package and identify such Hardware and ship with doors and frames for installation at the project site.

**2.07 FINISHES AND COLORS**

- A. Fiberglass Reinforced Polyester Colors: as selected by Architect from manufacturer's complete range.
- B. Aluminum Stiles and Rails: Comply with the following:
  - 1. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
  - 2. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 3. Dark Bronze: AA-M10C12C22A44, Class I, 0.7 mils thick or Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.
    - a. Dark bronze at Bemis

**PART 3 EXECUTION****3.01 INSTALLATION**

- A. Comply with manufacturer's recommendations and specifications for the installation of the doors and frames.
- B. Set units plumb, level and true to line, without warp or rack of doors, frames or panels. Anchor securely in place. Separate aluminum, and other corrodible metal surfaces, from sources of corrosion or electrolytic action at points of contact with other materials, with bituminous coatings, or other means as approved by Architect.
- C. Set saddles in a bed of compound.
- D. Clean Aluminum surfaces promptly after installation of doors and frames, exercising care to avoid damage to the protective coating (if any). Remove excess glazing and sealant compounds, dirt and other substances.
- E. Provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.
- F. Adjusting: Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight seal.
- G. Caulking: Refer to Section 07900 "Joint Sealants."

**END OF SECTION**





**SECTION 08 4113 – ALUMINUM ENTRANCES AND STOREFRONTS****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Exterior storefront framing.
  - 2. Storefront framing for window walls.
  - 3. Exterior manual-swing entrance door-frame units.
- B. Related Sections:
  - 1. Division 08 Section "FRP Doors" for requirements for FRP entrance doors installed in aluminum entrance and storefront framing.
  - 2. Division 08 Section "Glazing" for glass and glazing included as part of the aluminum entrance and storefront systems.

**1.03 PERFORMANCE REQUIREMENTS**

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
  - 1. Structural loads.
  - 2. Thermal movements.
  - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
  - 4. Dimensional tolerances of building frame and other adjacent construction.
  - 5. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Thermal stresses transferred to building structure.
    - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
    - d. Glazing-to-glazing contact.
    - e. Noise or vibration created by wind and thermal and structural movements.
    - f. Loosening or weakening of fasteners, attachments, and other components.
    - g. Sealant failure.
    - h. Failure of operating units to function properly.
- B. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. Provide sealant that fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
  - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
  - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

- C. Structural-Sealant Joints: Designed to produce tensile or shear stress in structural-sealant joints of less than 20 psi (138 kPa).
- D. Structural Loads:
  - 1. Show design loads determined by Project's structural engineer on Drawings or insert loads in two subparagraphs below. Verify requirements of authorities having jurisdiction. See Evaluations.
  - 2. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120°F (67°C), that could cause a metal surface temperature range of 180°F (100°C) within the framing system.
  - 3. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of 25 psf inward and 25 psf outward when tested in accordance with ASTM E 330.
- E. Deflection of Framing Members:
  - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is the smaller amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch (3.2 mm) and clearance between members and operable units directly below to less than 1/16 inch (1.5 mm).
- F. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- G. Aluminum Entrance Transmission Characteristics: Provide entrance doors with jamb and head frames that comply with requirements indicated for transmission characteristics.
  - 1. Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.
  - 2. Condensation Resistance: Provide entrance door units tested for thermal performance in accordance with AAMA 1502 showing a condensation resistance factor (CRF) of not less than 48.

#### 1.04 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
  - 1. Substitutions for products as specified MUST be submitted in accordance with Division 1. Substitute products not submitted in accordance with Division 1 Section "Product Requirements" will NOT be considered.

- B. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:
  - 1. Fabrication methods.
  - 2. Finishing.
  - 3. Accessories.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:
  - 1. Elevations.
  - 2. Detail sections of typical composite members.
  - 3. Hardware, mounting heights.
  - 4. Anchorages and reinforcements.
  - 5. Glazing details.
- D. Samples: Submit pairs of samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets. Where color or texture variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of variations.
- E. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

#### **1.05 QUALITY ASSURANCE:**

- A. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5-years successful experience in the installation of systems similar to those required.
- B. Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgment, differences do not materially detract from the design concept or intended performance.

#### **1.06 PROJECT CONDITIONS:**

- A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurement, and coordinate fabrication tolerances to ensure proper fit.

#### **1.07 WARRANTY:**

- A. Special Product Warranty: Submit a written warranty, executed by the Contractor, Installer and Manufacturer, agreeing to repair or replace units (including reglazing) which fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes and other materials beyond normal weathering. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.
  - 1. Warranty period for aluminum entrances and storefront is 3 years after the date of substantial completion.

**PART 2 PRODUCTS****2.01 MANUFACTURERS:**

- A. Manufacturer: Subject to compliance with requirements, provide the following products (refer to drawings for locations of each framing system):
  - 1. Basis-of-Design 2" x 6-1/2" Thermal Storefront Framing: EFCO Corporation, Series 406T
- B. Equivalent Manufacturers: Subject to compliance with requirements provide equivalent products of one of the following manufacturers: (Variations in specified and detailed Basis-of-Design framing dimensions are not acceptable.)
  - 1. Kawneer Co.
  - 2. Tubelite Division of Indal Inc.
  - 3. Vistawall Architectural Products.
  - 4. YKK AP America, Inc.

**2.02 MATERIALS:**

- A. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
  - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- D. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- F. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- G. Sliding Weatherstripping: Provide the manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.
- H. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of "Glazing" section of these specifications.

**2.03 COMPONENTS:**

- A. Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system with provisions for glass replacement. Shop-fabricate and pre-assemble frame components where possible.

1. Thermal-Break Construction: Fabricate storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.
- B. Aluminum Perimeter Door Framing:
  1. Fabricate tubular frame assemblies from the size and type shown. 0.125" minimum wall thickness and type 6063-T5 aluminum alloy. 0.625" x 1.25" applied door stops with screws and weatherstripping.
  2. Where wide strikes or electric strikes are used, a 0.625" x 1.75" stop with screws and weatherstripping shall be applied.
  3. Where surface applied hardware (exit device strikes, closer shoes, overhead stops, etc.) is to be mounted to the frame stop, provide solid bar stock reinforcement under the stop.
  4. Frame members are to be box type with four (4) enclosed sides. Open back framing will not be accepted. Frames must be anchored by removing the door stop, drilling a 0.5" pilot hole on the door side of the frame, and anchoring the frame from the wall side of the frame.

## 2.04 HARDWARE

- A. General: Refer to hardware section in Division-8 for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.

## 2.05 FABRICATION

- A. General: Sizes of door and frame units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.
  1. Pre-glaze door and frame units to greatest extent possible.
  2. Do not drill and tap for surface-mounted hardware items until time of installation of project site.
  3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- D. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.
  1. Attachments of all hardware shall be made using machine screws which are supplied by the manufacturer.
  2. All holes shall be drilled and tapped using the recommended drill size for the tap required.
  3. Frame stops shall be applied stop. Minimum 5/8" high x minimum 1¼" wide.
  4. Frame tubes sections should be closed back, minimum of 1/8" wall thickness.
  5. Door skins should be minimum of 1/8" wall thickness.
  6. Where hardware is to be attached to frame stop (i.e., exit device strike, door closer shoe), a piece of solid bar stock aluminum sized to fill the frame stop void x 18" long shall be securely attached to the frame tube.

7. Where it is not practical to have solid bar stock reinforcement at attachment points, use Riv-Nuts for attachment.
- E. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
  1. Uniformity of Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- G. Fasteners: Conceal fasteners wherever possible.
- H. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
  1. Provide EPDM or vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
  2. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.
  3. Provide finger guards of collapsible neoprene or PVC gasketing securely anchored into frame at hinge-jamb of center-pivoted doors.

## **2.06 FINISHES:**

- A. Color Anodic Finish: AAMA 611-98, AA-M12-C22-A44, Class 1.
  1. Color: Dark bronze
  2. Finish for schools: Bemis Elementary School

## **2.07 GLAZING:**

- A. Glazing: Comply with requirements indicated in Division 08 Section "Glazing".

# **PART 3 EXECUTION**

## **3.01 INSTALLATION:**

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.
  1. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.
- C. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- D. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealant, fillers, and gaskets.
- E. Refer to Division 8 Section "Glazing" for installation of glass and other panels indicated to be glazed into doors and framing, and not pre-glazed by manufacturer.

**3.02 ADJUSTING:**

- A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

**3.03 CLEANING:**

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

**3.04 PROTECTION:**

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

**END OF SECTION**





**SECTION 08 7100 – DOOR HARDWARE****PART 1 – GENERAL****1.01 SUMMARY**

- A. Section includes furnishing, installation and commissioning of mechanical door hardware for doors specified in “Hardware Sets” and required by actual conditions: including screws, bolts, expansion shields, electrified door hardware, and other devices for proper application of hardware.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Divisions:
  - 1. Division 03 Concrete
  - 2. Division 06 Rough & Finish Carpentry
  - 3. Division 07 Joint Sealants
  - 4. Division 08 Openings
  - 5. Division 09 Finishes

**1.02 REFERENCES**

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):
  - 1. ANSI/BHMA A156.1 Butts & Hinges (2016)
  - 2. ANSI/BHMA A156.3 Exit Devices (2014)
  - 3. ANSI/BHMA A156.4 Door Controls – Closers (2013)
  - 4. ANSI/BHMA A156.5 Cylinders and Input Devices for Locks (2014)
  - 5. ANSI/BHMA A156.6 Architectural Door Trim (2015)
  - 6. ANSI/BHMA A156.7 Template Hinge Dimensions (2016)
  - 7. ANSI/BHMA A156.13 Mortise Locks & Latches (2012)
  - 8. ANSI/BHMA A156.18 Materials & Finishes (2016)
  - 9. ANSI/BHMA A156.21 Thresholds (2014)
  - 10. ANSI/BHMA A156.22 Door Gasketing Systems (2012)
  - 11. ANSI/BHMA A156.26 Continuous Hinges (2012)
  - 12. ANSI/BHMA A156.28 Keying Systems (2013)
  - 13. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Steel Frames (2014)
  - 14. ANSI/BHMA A156.115W Hardware Preparation in Wood Doors with Wood or Steel Frames (2016)
- B. International Code Council/American National Standards Institute (ICC/ANSI)/ADA:
  - 1. ICC/ANSI A117.1 Standards for Accessible and Usable Buildings and Facilities 2017.
- C. Underwriters Laboratories, Inc. (UL):
  - 1. UL 10C Positive Pressure Fire Test of Door Assemblies.
  - 2. UL 1784 Air Leakage Test of Door Assemblies.
  - 3. UL 294 Access Control System Units
- D. Door and Hardware Institute (DHI):
  - 1. DHI Publications – Keying Systems and Nomenclature (1989).
  - 2. DHI Publication – Abbreviations and Symbols.
  - 3. DHI Publication – Installation Guide for Doors and Hardware.
  - 4. DHI Publication – Sequence and Format of Hardware Schedule (1996).
- E. National Fire Protection Agency (NFPA):
  - 1. NFPA 70 National Electrical Code 2017.
  - 2. NFPA 80 Standard for Fire Doors and Other Opening Protectives 2016.
  - 3. NFPA 101 Life Safety Code 2018.
  - 4. NFPA 105 Standard for the Installation of Smoke Door Assemblies 2016.

**1.03 SUBMITTALS**

- A. Submit in accordance with Conditions of the Contract and Division 1 Administrative Requirements and Submittal Procedures Section.
- B. Shop Drawings:
  - 1. Organize hardware schedule in vertical format as illustrated in DHI Publications Sequence and Formatting for the Hardware Schedule. Include abbreviations and symbols page according to DHI Publications Abbreviations and Symbols. Complete nomenclature of items required for each door opening as indicated.

2. Coordinate final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.
3. Architectural Hardware Consultant (AHC), as certified by DHI, who will affix seal attesting to completeness and correctness, including the review of the hardware schedule prior to submittal.
- C. Submit manufacturer's catalog sheet on design, grade, and function of items listed in hardware schedule. Identify specific hardware item per sheet, provide an index, and cover sheet.
- D. Templates:
  1. Upon final approval of the architectural hardware schedules, submit one set of complete templates for each hardware item to the door manufacturers, frame manufacturers, and the installers. Date and index these 8-1/2 inch x 11 inch papers in a three ring binder, including detailed lists of the hardware location requirements for mortised and surface applied hardware within fourteen days of receiving approved door hardware submittals.
- E. Closeout Submittals: Submit to Owner in a three-ring binder or CD if requested.
  1. Warranties.
  2. Maintenance and operating manual.
  3. Maintenance service agreement.
  4. Record documents.
  5. Copy of approved hardware schedule.
  6. Copy of approved keying schedule with bitting list.
  7. Door hardware supplier name, phone number, and fax number.

#### **1.04 QUALITY ASSURANCE**

- A. Listed and Labeled electrified door hardware as defined in NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction.
- B. Hardware supplier will employ an Architectural Hardware Consultant (AHC) as certified by DHI and a member of the seal program who will be available at reasonable times during course of work for Project hardware consultation.
- C. Door hardware conforming to ICC/ANSI A117.1: Handles pulls, latches locks and operating devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
- D. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and/or labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C, unless otherwise indicated.
- E. Fire Door Inspection: Prior to receiving certificate of occupancy have fire rated doors inspected by an independent Certified Fire and Egress Door Assembly Inspector (FDAI), as certified by Intertek (ITS), a written report be submitted to Owner and Contractor. Doors failing inspection must be adjusted, replaced or modified to be within appropriate code requirements.
- F. 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.
- G. Door hardware certified to ANSI/BHMA standards as noted, participate and be listed in BHMA Certified Products Directory.
- H. Substitution request: create a comparison chart that includes the testing information as well as the warranty for both the specified product and the proposed substitution. Include the reason for requesting the substitution, clear catalog copy highlighting the proposed product and options, compliance statement, technical data, product warranty and lead time, to show how the proposed can meet or exceed established level of design, function, and quality. Approval of request is at the discretion of the owner, architect, and their designated consultants and will be addressed via addendum prior to bid date.
  1. Items listed with no substitute manufacturers have been requested by the Owner to meet existing standard and will not be reviewed for substitution, unless the product is no longer available.
- I. Meetings: Comply with requirements in Division 1 Section "Project Meetings."
  1. Keying Meeting

- a. Within fourteen days of receipt of approved door hardware submittals, contact Owner with representative from hardware supplier to establish a keying conference. Verify keyway, visual key identification, number of master keys and keys per lock. Provide keying system per Owner's instructions.
2. Pre-installation Meeting
  - a. Convene meeting within fourteen days of receipt of approved door hardware submittals. Participants required to attend: Contractor, installer, material supplier, manufacturer representatives.
  - b. Include in-conference decisions regarding proper installation methods and procedures for receiving and handling hardware.
  - c. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
- J. Installer Qualifications: Specialized in performing installation of this Section and have five years minimum documented experience.
- K. Hardware listed in 3.07 – Hardware Schedule is intended to establish minimum level of design, type, function and grade of hardware to be used.
- 1.05 DELIVERY, STORAGE, AND HANDLING**
  - A. Provide clean, dry and secure room for hardware delivered to Project but not yet installed. Shelf hardware off of the floor and with larger items of hardware being stored on wooden pallets. Arrange locksets and keyed cylinders by opening number. Organize the balance of hardware by brand, model of hardware, and hardware set number. Leave the door markings of the hardware visible for installers.
  - B. Furnish hardware that is not bulk packed with each unit marked and numbered in accordance with approved finish hardware schedule. Include architect's opening number, hardware set number, and item number for each type of hardware. Include keyset symbols and corresponding hardware component for keyed products.
  - C. Pack each item complete with necessary parts and fasteners in manufacturer's original packaging.
  - D. Deliver architectural hardware to the job site according to the phasing agreed upon in the pre-installation meeting. Inventory the delivery with the supplier's assistance. Immediately note shortages and damages on the shipping receipts and bill of lading. Coordinate replacement or repair with the supplier.
  - E. Deliver permanent keys, cores, and related accessories directly to Owner via registered mail or overnight package service. Establish the instructions for delivery to Owner at "Keying Conference."
  - F. Waste Management and Disposal: Separate waste materials for use or recycling in accordance with Division 1.
- 1.06 WARRANTY**
  - A. General Warranty: Owner may have under provisions of the Contract Documents and be an addition and run concurrently with other warranties made by Contractor under requirements of the Contract documents.
  - B. Special Warranty: Warranties specified in this article will not deprive Owner of other rights.
    1. Ten years for manual door closers.
    2. Five years for mortise, auxiliary and bored locks.
    3. Five years for exit devices.
  - C. Replace or repair defective products during warranty period in accordance with manufacturer's warranty at no cost to Owner. There is no warranty against defects due to improper installation, abuse, and failure to exercise normal maintenance.
  - D. Maintenance Tool and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, removal and replacement of door hardware.

**PART 2 – PRODUCTS****2.01 HINGES**

- A. Hinges, electric hinges, and self-closing hinges of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Products to be certified and listed by the following:
  - 1. Butts and Hinges: ANSI/BHMA A156.1.
  - 2. Template Hinge Dimensions: ANSI/BHMA A156.7.
  - 3. Self-Closing Hinges: ANSI/BHMA A156.17.
- C. Butt Hinges:
  - 1. Hinge weight and size unless otherwise indicated in hardware sets:
    - a. Doors up to 36" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .134" and a minimum of 4-1/2" in height.
    - b. Doors from 36" wide up to 42" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .145" and a minimum of 4-1/2" in height.
    - c. For doors from 42" wide up to 48" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
    - d. Doors greater than 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
    - e. Width of hinge is to be minimum required to clear surrounding trim.
  - 2. Base material unless otherwise indicated in hardware sets:
    - a. Exterior Doors: 304 Stainless Steel, Brass or Bronze material.
    - b. Interior Doors: Steel material.
    - c. Fire Rated Doors: Steel or 304 Stainless Steel materials.
    - d. Stainless Steel ball bearing hinges to have stainless steel ball bearings. Steel ball bearings are unacceptable.
  - 3. Quantity of hinges per door unless otherwise stated in hardware sets:
    - a. Doors up to 60" in height provide 2 hinges.
    - b. Doors 60" up to 90" in height provide 3 hinges.
    - c. Doors 90" up to 120" in height provide 4 hinges.
    - d. Doors over 120" in height add 1 additional hinge per each additional 30" in height.
    - e. Dutch doors provide 4 hinges.
  - 4. Hinge design and options unless otherwise indicated in hardware sets:
    - a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
    - b. Out-swinging exterior and out-swinging access controlled doors are required to have Non-Removable Pins (NRP) to prevent removal of pin while door is in closed position.
    - c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
    - d. When shims are necessary to correct frame or door irregularities, provide metal shims only.
  - 5. Acceptable Manufacturers:

|          | Standard Weight | Heavy Weight    |
|----------|-----------------|-----------------|
| Hager    | BB1279/BB1191   | BB1168/BB1199   |
| Bommer   | BB5000/BB5002   | BB5004/BB5006   |
| McKinney | TA2714/TA2314   | T4A3786/T4A3386 |

**2.02 CONTINUOUS HINGES**

- A. Continuous hinges of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Products to be certified and listed by ANSI/BHMA A156.26 Grade 1.
- C. Continuous Geared Hinges:
  - 1. Determine model number by door and frame application, door thickness, frequency of use, and fire rating requirements according to manufacturer's recommendations.
    - a. Size length of hinge to equal the actual door height unless otherwise stated in hardware sets.

**D. Material and Design:**

1. Base material: Anodized aluminum manufactured from 6063-T6 material, unexposed working metal surfaces be coated with TFE dry lubricant.
2. Bearings:
  - a. Vertical loads be carried on Lubriloy RL bearings for non-fire rated doors.
  - b. Continuous hinges are to have a minimum spacing between bearings of 2-9/16". Typical door from 80" to 84" in height to have a minimum of 32 bearings.
3. Options:
  - a. Hinges to have Rounded Back Cover Channel (RBCC).
  - b. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
  - c. At fire rated openings provide hinges that carry a UL certification, up to and including 90-minute applications for wood doors and up to 3-hour applications for metal doors.

**E. Acceptable Manufacturers:**

|        |                     |
|--------|---------------------|
|        | Heavy Duty          |
| Hager  | 780-112HD/780-224HD |
| Bommer | FMHD/FMSLFHD        |
| Zero   | 914A/910A           |

**2.03 LOCKS AND LATCHES**

- A. Locks and latches of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Product to be certified and listed by following:
  1. ANSI/BHMA A156.13 Series 1000 Certified to Grade 1 for Operational and Security.
  2. UL/cUL Labeled and listed up to 3 hours for single doors up to 48" in width and up to 96" in height.
  3. UL10C/UBC 7-2 Positive Pressure Rated.
  4. ICC/ANSI A117.1.
- C. Lock and latch function numbers and descriptions of manufacturer's series as listed in hardware sets.
- D. Material and Design:
  1. Lock cases from fully wrapped, 12 gauge steel, zinc dichromate for corrosion resistance.
  2. Non-handed, field reversible without opening lock case.
  3. Break-away spindles to prevent unlocking during forced entry or vandalism.
  4. Levers, zinc cast, forged brass or stainless steel and plated to match finish designation in hardware sets.
  5. Sectional Roses, solid brass or stainless steel material and have a minimum diameter of 2-7/16".
  6. Armor fronts, self-adjusting to accommodate a square edge door or a standard 1/8" beveled edge door.
- E. Latch and Strike:
  1. Stainless steel latch bolt with minimum of 3/4" throw and deadlocking for keyed and exterior functions.
  2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4" x 4-7/8" with proper lip length to protect surrounding trim.
  3. Deadbolts to be 1-3/4" total length with a minimum of a 1" throw and 3/4" internal engagement when fully extended and made of stainless steel material.
- F. Options:
  1. Provide knurled levers on entry side of doors that are potentially dangerous to visually impaired persons.
- G. Acceptable Manufacturers:

|         |              |
|---------|--------------|
| Hager   | 3800 Series  |
| Schlage | L9000 Series |

**2.04 EXIT DEVICES**

- A. Exit Devices of one manufacturer as listed for continuity of design and consideration of warranty. Touchpad type, finish to match balance of door hardware.
- B. Standards: Manufacturer to be certified and/or listed by the following:
  - 1. BHMA Certified ANSI A156.3 Grade 1.
  - 2. UL/cUL Listed for up to 3 hours for "A" labeled doors.
  - 3. UL10C/UBC 7-2 Positive Pressure Rated.
  - 4. UL10B Neutral Pressure Rated.
  - 5. UL 305 Listed for Panic Hardware.
  - 6. 2007 Florida Building Code Certification Number: FL9481.1.
  - 7. ANSI/BHMA A250.13 Severe Windstorm Resistant Component.
- C. Material and Design:
  - 1. Provide exit devices with actuators that extend a minimum of one-half of door width.
  - 2. Where trim is indicated in hardware sets provide the lever design to match design of lock levers.
  - 3. Exit device to mount flush with door.
  - 4. Latchbolts:
    - a. Rim device – 3/4" throw, Pullman type with automatic dead-latching, stainless steel
    - b. Surface vertical rod device – Top 1/2" throw, Pullman type with automatic dead-latching, stainless steel. Bottom 1/2" throw, Pullman type, held retracted during door swing, stainless steel.
  - 5. Fasteners: Wood screws, machine screws, and thru-bolts.
- D. Lock and Latch Functions: Function numbers and descriptions of manufacturer's series and lever styles indicated in door hardware sets.
- E. Acceptable Manufacturers:

|            |             |             |
|------------|-------------|-------------|
| Hager      | 4500 Series | 4600 Series |
| Von Duprin | 99 Series   | 33 Series   |

**2.05 CYLINDERS AND KEYING**

- A. Cylinders of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Products to be certified and listed by the following:
  - 1. Auxiliary Locks: ANSI/BHMA A156.5
- C. Cylinders:
  - 1. Provide cylinders matched to the types required for hardware that has a locking function and for keyed electronic functions. Furnish with appropriate collars, cams, and tailpieces to fit and operate associated hardware. Stacking collars is not acceptable, a single collar of proper size is required.
  - 2. Provide concealed key control (CKC) at cylinder by stamping or permanently marking the keyset symbol in a location on the cylinder that is concealed when installed.
- D. Keying:
  - 1. Key into Owner's existing KABA Peaks key system.
  - 2. Provide a bitting list to Owner of combinations as established, and expand to twenty-five percent for future use or as directed by Owner.
    - a. Include all of the keysets and bittings of the original key system creating one clean version of the entire key system.
  - 3. Keys to be shipped directly to the Owner's Representative as established during the keying conference.
    - a. Package the keys in individual envelopes, grouped by keyset symbol, and label envelopes with project name, factory registry number, and keyset symbol.
  - 4. Stamp large bow key blanks with visual key control (keyset symbol) and "Do Not Duplicate".
- E. Acceptable Manufacturers:

|                    |
|--------------------|
| KABA Peaks by ILCO |
|--------------------|

**2.06 CLOSERS**

- A. Closers of one manufacturer as listed for continuity of design and consideration of warranty, unless otherwise indicated on hardware schedule, comply with manufacturer's recommendations for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirement, and fire rating.
- B. Standards: Manufacturer to be certified and or listed by the following:
  - 1. BHMA Certified ANSI A156.4 Grade 1.
  - 2. ADA Complaint ANSI A117.1.
  - 3. UL/cUL Listed up to 3 hours.
  - 4. UL10C Positive Pressure Rated.
  - 5. UL10B Neutral Pressure Rated.
- C. Material and Design:
  - 1. Provide cast iron non-handed bodies with full plastic covers.
  - 2. Closers will have separated staked adjustable valve screws for latch speed, sweep speed, and backcheck.
  - 3. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting.
  - 4. One-piece seamless steel spring tube sealed in hydraulic fluid.
  - 5. Double heat-treated steel tempered springs.
  - 6. Precision-machined heat-treated steel piston.
  - 7. Triple heat-treated steel spindle.
  - 8. Full rack and pinion operation.
- D. Mounting:
  - 1. Out-swing doors use surface parallel arm mount closers except where noted on hardware schedule.
  - 2. In-swing doors use surface regular arm mount closers except where noted on hardware schedule.
  - 3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
  - 4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.
- E. Size closers in compliance with requirements for accessibility (ADAAG). Comply with following maximum opening force requirements.
  - 1. Interior hinged openings: 5.0 lbs.
  - 2. Fire-rated and exterior openings use minimum opening force allowable by authority having jurisdiction.
- F. Fasteners: Provide self-reaming, self-tapping wood and machine screws, and sex nuts and bolts for each closer.
- G. Acceptable manufacturers:

|       |               |
|-------|---------------|
| Hager | 5100 Series   |
| LCN   | 4040XP Series |

**2.07 PROTECTIVE TRIM**

- A. Protective trim of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Size of protection plate: single doors, size two inches less door width (LDW) on push side of door, and one inch less door width on pull side of door. For pairs of doors, size one inch less door width (LDW) on push side of door, and 1/2 inch on pull side of door. Adjust sizes to accommodate accompanying hardware, such as, edge guards, astragals and others.
  - 1. Kick Plates 10" high or sized to door bottom rail height.
  - 2. Mop Plates 4" high.
  - 3. Armor Plates 36" high.
- C. Products to be certified and listed by the following:
  - 1. Architectural Door Trim: ANSI/BHMA A156.6.
  - 2. UL.
- D. Material and Design:
  - 1. 0.050" gage stainless steel.

2. Corners square, polishing lines or dominant direction of surface pattern so they run across door width of plate.
3. Bevel top, bottom, and sides uniformly leaving no sharp edges.
4. Countersink holes for screws. Space screw holes so they are no more than eight inches CTC, along a centerline not over 1/2" in from edge around plate. End screws maximum of 0.53" from corners.
- E. UL label stamp required on protection plates when top of plate is more than 16 inches above bottom of door on fire rated openings. Verify door manufacturer's UL listing for maximum height and width of protection plate to be used.
- F. Acceptable Manufacturers:

|        |      |
|--------|------|
| Hager  | 190S |
| Trimco |      |
| Burns  |      |

## 2.08 STOPS AND HOLDERS

- A. Stops and holders of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops and holders mounted in concrete floor or masonry walls have stainless steel machine screws and lead expansion shields.
- C. Products to be certified and listed by the following:
  1. Auxiliary Hardware: ANSI/BHMA A156.16.
- D. Acceptable Manufacturers:

|          | Convex | Concave |
|----------|--------|---------|
| Hager    | 232W   | 236W    |
| Rockwood |        |         |
| Burns    |        |         |

## 2.09 SILENCERS

- A. Where smoke, light, or weather seal are not required, provide three silencers per single door frame, two per double door frame and four per Dutch door frame.
- B. Products to be certified and listed by the following:
  1. Auxiliary Hardware: ANSI/BHMA A156.16
- C. Acceptable Manufacturers:

|          | Hollow Metal Frame | Wood Frame |
|----------|--------------------|------------|
| Hager    | 307D               | 308D       |
| Rockwood |                    |            |
| Trimco   |                    |            |

## 2.10 FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if within range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples.
- B. Comply with base material and finish requirements indicated by ANSI/BHMA A156.18 designations in hardware schedule.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

- A. Examine doors and frames, with Installers present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.



- B. Notify Architect via a prepared written report and endorsed by Installer of any discrepancies between the door schedule, door types, drawings and scheduled hardware. Report will have a list of conditions detrimental to application, to the proper and timely completion of the work and performance of the hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### **3.02 INSTALLATION**

- A. Install hardware using manufactures recommended fasteners and installation instructions, at height locations and clearance tolerances that comply with:
  - 1. NFPA 80
  - 2. NFPA 105
  - 3. ICC/ANSI A117.1
  - 4. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Steel Frames
  - 5. ANSI/BHMA A156.115W hardware Preparation in Wood Doors with Wood or Steel Frames
  - 6. DHI Publication – Installation Guide for Doors and Hardware
  - 7. Approved shop drawings
  - 8. Approved finish hardware schedule
- B. Install soffit mounted gaskets prior other soffit mounted hardware to provide a continuous seal around the perimeter of the opening without cutting or notching.
- C. Install door closers so they are on the interior of the room side of the door. Stairwell doors will have closers mounted on the stair side and exterior doors will be mounted on the interior side of the building.
- D. In drywall applications provide blocking material of sufficient type and size for hardware items that mount directly to the wall.
- E. Locate wall mounted bumper to contact the trim of the operating trim.
- F. Mount mop and kick plates flush with the bottom of the door and centered horizontally on the door.
- G. Set thresholds for exterior, and acoustical doors at sound control openings in full bed of sealant complying with requirements specified in Division 07 Section “Joint Sealants” forming a tight seal between threshold and surface to which set.
- H. Anchor all components firmly into position and use anchoring devices furnished with the hardware item, unless otherwise specified.
- I. Do not install surface mounted items until finishes have been completed on substrates involved. Set unit level, plumb and true to line location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

### **3.03 FIELD QUALITY CONTROL**

- A. Material supplier to schedule final walk through to inspect hardware installation ten (10) business days before final acceptance of Owner. Material supplier will provide a written report detailing discrepancies of each opening to General Contractor within seven (7) calendar days of walk through.

### **3.04 ADJUSTMENT, CLEANING, AND DEMONSTRATING**

- A. Adjustment: Adjust and check each opening to ensure proper operation of each item of finish hardware. Replace items that cannot be adjusted to operate freely and smoothly or as intended for application at no cost to Owner.
- B. Cleaning: Clean adjacent surfaces soiled by hardware installation. Clean finish hardware per manufacturer's instructions after final adjustments have been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no cost to Owner.
- C. Conduct a training class for building maintenance personnel demonstrating the adjustment, operation of mechanical and electrical hardware. Special tools for finish hardware to be turned over and explained usage at the meeting. Record all training and provide to the Owner for future reference.

### **3.05 PROTECTION**

- A. Leave manufacturer's protective film intact and provide proper protection for all other finish hardware items that do not have protective material from the manufacture until Owner accepts project as complete.

**3.06 HARDWARE SET SCHEDULE**

- A. Intent of Hardware Groups
1. Should items of hardware not specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
  2. Where items of hardware aren't correctly specified and are required for completion of the Work, a written statement of such omission, error, or other discrepancy is required to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
- B. Guide: Door hardware items have been placed in sets which are intended to be a guide of design, grade, quality, function, operation, performance, exposure, and like characteristics of door hardware, and may not be complete. Provide door hardware required to make each set complete and operational.
- C. Hardware schedule does not reflect handing, backset, method of fastening, and like characteristics of door hardware and door operation.
- D. Review door hardware sets with door types, frames, sizes and details on drawings. Verify suitability and adaptability of items specified in relation to details and surrounding conditions.

**3.07 HARDWARE SCHEDULE****Troy High School STEM Lab****Hardware Group No. 01 – THS E206A**

|   |    |                  |                         |       |      |
|---|----|------------------|-------------------------|-------|------|
| 3 | EA | HINGE            | BB1279 4 1/2 X 4 1/2    | US26D | HA   |
| 1 | EA | LOCKSET          | 3857S SECT ARC LESS CYL | US26D | HA   |
| 2 | EA | MORTISE CYLINDER | (MATCH EXISTING SYSTEM) |       | KABA |
| 1 | EA | WALL STOP        | 232W                    | US26D | HA   |

**Hardware Group No. 02 - Bemis A164 & A165****EACH TO HAVE:**

| QTY |     | DESCRIPTION    | CATALOG NUMBER          | FINISH | MFR |
|-----|-----|----------------|-------------------------|--------|-----|
| 1   | EA  | CONT. HINGE    | 112HD                   | 710    | IVE |
| 1   | EA  | PANIC HARDWARE | 98-NL-OP-110MD          | 313    | VON |
| 1   | EA  | CYLINDER       | (MATCH EXISTING SYSTEM) | 613    |     |
| 1   | EA  | CONCEALED PULL | (BY DOOR MFR)           |        |     |
| 1   | EA  | SURFACE CLOSER | 4111 SCUSH              | 695    | LCN |
| 1   | SET | WEATHER SEAL   | (BY FRAME MFR)          |        |     |
| 1   | EA  | DOOR SWEEP     | (BY DOOR MFR)           |        |     |
| 1   | EA  | THRESHOLD      | 568D-223                | D      | ZER |

**END OF SECTION**

**SECTION 08 8000 – GLAZING****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows.
  - 2. Doors.
  - 3. Storefront framing.
  - 4. Glazed entrances.
  - 5. Interior borrowed lites.
- B. Safety Glass Where Required: Meet or exceed applicable current requirements of ANSI Z97.1 "Safety Glazing" and CPSC 16 CFR, Category II.

**1.03 DEFINITIONS**

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

**1.04 PERFORMANCE REQUIREMENTS**

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
    - a. Specified Design Wind Loads: Not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
    - b. Specified Design Snow Loads: Not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
    - c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
      - 1) For monolithic-glass lites heat treated to resist wind loads.
      - 2) For insulating glass.
      - 3) For laminated-glass lites.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 1/4 inch thick.
  2. For laminated-glass lites, properties are based on products of construction indicated.
  3. For insulating-glass units, properties are based on units with lites 1/4 inch thick and a nominal 1/2-inch- (12.7-mm-) wide interspace.
  4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
    - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
    - b. Solar Heat Gain Coefficient: NFRC 200.
    - c. Solar Optical Properties: NFRC 300.

## 1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
1. Samples:
  2. Each type and thickness of glass: three (3) samples, 12 inches square.
  3. Gaskets and Tapes: Three (3) samples, 6 inches long; each type and shape; molded corners for each type of gasket.
- B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

- C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- D. Qualification Data: For installers.

#### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain glass through one source from a single manufacturer for each glass type.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- D. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- E. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- F. Safety Glazing Products including wired glass: Comply with testing requirements in CPSC 16 CFR 1201, Category II and ANSI Z97.1.
  - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
  - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
  - 2. AAMA Publications: AAMA GD SG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Sloped Glazing Guidelines."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
  - 1. Insulating Glass Certification Council.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

**1.08 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Primary Glass Manufacturers:
    - a. AFG Industries, Inc.
    - b. Guardian Industries, Inc.
    - c. Pilkington Building Products North America
    - d. PPG Industries, Inc.
    - e. Viracon
    - f. Visteon Corp.

**2.02 GLASS PRODUCTS**

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
  - 2. Heat Strengthened: Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
  - 3. Tempered: Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Tinted Glass:
  - 1. Product: Subject to compliance with requirements, provide Solarban 60 SOLARGRAY as manufactured by PPG Industries, Inc. or equal by one of the above listed primary glass manufacturers
  - 2. Color: Gray
  - 3. Comply with the following properties for one-inch insulating glass with Low-E Coating:
    - a. Visible Light Transmittance: 35%
    - b. Summer U-Value: 0.27

- c. Winter U-Value: 0.29
  - d. Solar Heat Gain Coefficient: 0.25
  - e. Shading Coefficient: 0.29
- D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article.
  - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
  - 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
  - 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
  - 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
    - a. Polyisobutylene and polysulfide or silicone.
      - 1) Silicone seal is required for all four sided or two-sided structural glazing.
  - 5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
    - a. Spacer Material:
      - 1) Aluminum with mill or clear anodic finish for non-structurally glazed applications
      - 2) Aluminum with black, color anodic finish for structurally glazed applications.
    - b. Desiccant: Molecular sieve, silica gel, or blend of both.
    - c. Corner Construction: Manufacturer's standard corner construction.
- E. Low Emissivity-Coated Insulating Glass Units (Low-E): Manufacturer's standard unit with one pane coated with pyrolytic or sputtered, neutral colored, Low-E coating, on third surface of tinted insulating unit or second surface of clear insulating unit. See glass schedule for types and thicknesses.
  - 1. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.
  - 2. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

### 2.03 LAMINATED AND INSULATED METAL PANELS

- A. 1" Insulated Metal Glazing Panels: Panels shall consist of a laminated sandwich of polyisocyanurate insulation core, 0.060 Polyallomer substrate and smooth aluminum skins 0.021" thick minimum. The entire sandwich shall be bonded under heat and pressure with permanently elastic neoprene contact adhesive.
  - 1. Panel Thickness: 1 inch unless indicated otherwise.
  - 2. Color: PVDF/Kynar 500 to match adjacent framing.
  - 3. Interior Finish: same as face sheet.
  - 4. Manufacturer: Subject to compliance with requirements, provide Laminators Inc. "Thermo Lite" System or approved equal.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum units.

1. Brackets not exposed to weather or abrasion may be hot-dip galvanized steel complying with ASTM A 386.
  2. Provide non-staining, nonferrous shims for installation and alignment of curtain wall work.
- C. Fasteners and Accessories: Provide manufacturer's standard non-corrosive fasteners and accessories compatible with materials used in the framing system and with exposed portions.

#### **2.04 GLAZING TAPES**

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 Glazing Tape: Tremco #440; Shore A hardness of 10 at installation and not exceeding 20 upon aging

#### **2.05 GLAZING GASKETS**

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, black, and of profile and hardness required to maintain watertight seal:
1. Silicone, ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. Silicone.

#### **2.06 GLAZING SEALANTS**

- A. Sealant for Glazing: Meet requirements for materials and workmanship specified under Division 7 Section "Joint Sealants."
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

#### **2.07 MISCELLANEOUS GLAZING MATERIALS**

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.



- C. Setting Blocks: Neoprene or EPDM 70 to 90 Shore A Hardness as recommended by manufacturer; certified non-staining and compatible with sealant. Use EPDM for units set with silicone glazing sealant.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

## 2.08 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges and corners.
- C. Glazing Contractor, Glass Fabricator and Glass Manufacturer shall determine which areas require heat strengthening. The glazing contractor shall include in his bid and shall install heat strengthened glass where it is required by manufacturer and/or fabricator.

## 2.09 GLASS SCHEDULE

- A. Schedule of Glass Types:
  - GL-1 Tempered Monolithic Glass:
    - Tint: Clear
    - Thickness: 1/4"
  - GL-11 Tempered Insulating Glass consisting of:
    - Exterior Lite: 1/4"
    - Tint: Gray
    - Airspace: 1/2"
    - Interior Lite: 1/4"
    - Tint: Clear
    - Low-E Coating: #3 Surface.
  - GL-14 Insulated Metal Panel
    - Thickness: 1"
    - Color: Match adjacent storefront framing

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep system.

3. Minimum required face or edge clearances.
  4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

### 3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
1. Install glass in accordance with recommendations outlined in "Glazing Manual" and "Glazing Sealing Systems Manual" prepared by Flat Glass Marketing Association.
- B. Interior glazing shall be dryset with black glazing tape.
- C. Exterior glazing at entrance doors, sidelights, transoms, window wall frames, and similar members shall be installed with dryset gasket glazing.
- D. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- E. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- F. Apply primers to joint surfaces where required for adhesion of sealants.
- G. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- H. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- I. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- J. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- K. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

**3.04 TAPE GLAZING**

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

**3.05 GASKET GLAZING**

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

**3.06 CLEANING AND PROTECTION**

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

**END OF SECTION**



**SECTION 09 9100 - PAINTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes, labor, materials and equipment for Painting and Finishing.
- B. The following sections contain requirements that relate to this Section:
  - 1. Division 06 Section "Interior Architectural Woodwork" for factory finished millwork.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
  - 1. Submit 8-1/2 x 11 color downs on heavy paper to match Architect's color chips for each color and type of paint specified for Architect's approval.
    - a. Architect will furnish a schedule after beginning of construction. The schedule will include color chips for matching.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- C. Material Certificates: For scrub resistance and washability, signed by manufacturers.

**1.4 QUALITY ASSURANCE**

- A. Architect has the option of requesting test patches in place for Architect's approval of final color and finish.
  - 1. Notify Architect 48 hours in advance of the time the test patches will be ready for inspection.
- B. Manufacturer shall certify that tests have been performed on semi-gloss wall finish and others as selected by the Architect. Acceptance of materials is conditional upon demonstration of washability and abrasion resistance of test patches. Testing shall include the following:
  - 1. Scrub resistance per ASTM D2486-79: Value as specified in approved finish schedule but not less than 1200.
  - 2. Washability per ASTM D3450-80: Value as specified in approved finish schedule but not less than 80% for sponge and 90% for brush.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.
    - a. Do not store oil or paint soaked rags inside the building.
  - 3. Do not store materials in any room containing a direct-fired heating unit.
- B. Mix and thin paints in strict accordance with recommendations of the manufacturer.
  - 1. Mix paints only in areas designated, and provided proper protection for walls and floors.

**1.6 PROJECT CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply interior paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce manufacturer and product lists, the following requirements apply for product selection:
  - 1. Products: Subject to compliance with requirements, provide one of the products specified.

**2.2 PAINT, GENERAL**

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

**2.3 COLORS**

- A. The Architect has the option of accenting certain building elements different colors; (i.e.: doors, frames, columns, ceilings, walls) to be defined in a Schedule.
- B. The Architect reserves the right to select colors from manufacturer's standard or premium price groups, including deep tone colors for both interior and exterior products.
- C. Furnish an equal product by the same manufacturer only in those instances where a deep tone color specified by the Architect is not available in the specified product. This is subject to Architect's approval.
- D. Tinted primer shall be used whenever deep tone colors are specified.

**2.4 EXTERIOR FINISHES**

- A. Ferrous Metals (i.e. doors, railings, fences, lintels, etc.):
  - 1. First Coat: (If flash rusting occurs, use two coats)
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series
  - 2. Second and Third Coats:
    - a. Sherwin Williams: DTM Acrylic Gloss Coating (Water Reducible), B66-100
- B. Concrete, Masonry, Concrete Block, and Stucco - Sealer:
  - 1. First and Second Coats: Apply per manufacturer's recommendations.
    - a. United Coatings Inc; Canyon Tone Stain. Custom colored.
    - b. No substitutions shall be accepted.
- C. Cementitious Materials:
  - 1. Preparation: Add a prime coat if recommended by manufacturer (for a total of 3 coats).
  - 2. Two Coats:
    - a. Sherwin Williams: A-100 Satin Latex House and Trim Paint, A82 Series
- D. Composition Board, Hardboard, Fiberboard:
  - 1. First Coat:
    - a. Sherwin Williams: Exterior Latex Wood Primer B42W8041
  - 2. Second and Third Coats:
    - a. Sherwin Williams: A-100 Satin Latex House and Trim Paint, A82 Series
- E. Wood:
  - 1. First Coat:
    - a. Sherwin Williams: Exterior Latex Wood Primer B42W8041
  - 2. Second and Third Coats:
    - a. Sherwin Williams: A-100 Satin Latex House and Trim Paint, A82 Series
- F. Previously Painted Cement Plaster (new cement plaster shall remain unpainted):
  - 1. First Coat: Sherwin Williams: Exterior Latex Wood Primer B42W8041
  - 2. Second and Third Coats:
    - a. Sherwin Williams: A-100 Satin Latex House and Trim Paint, A82 Series
- G. Exterior Structural Steel exposed to view.
  - 1. For warranty purposes, the Contractor shall insure that the specified primer in Division 5 "Structural Steel" and the intermediate and finish coats specified below are from the same manufacturer.
    - a. No coatings shall be applied until approved by the Architect and Owner's Representative.
  - 2. Prime Coat: Refer to Division 5, "Structural Steel."
  - 3. Intermediate Coat:
    - a. Sherwin Williams: One (1) coat Macropoxy 646 FC @ 5-10 mils DFT.
  - 4. Finish Coat:
    - a. Sherwin Williams: One (1) coat Acrolon 218 HS @ 3-6 mils DFT.

**2.5 INTERIOR FINISHES**

- A. Plaster and Gypsum Board Ceilings and Ceiling Drops
  - 1. First Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
  - 2. Second Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Latex Flat B30 Series
  - 3. Third Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Latex Flat B30 Series
- B. Plaster and Gypsum Board Walls and Columns – Non-epoxy:
  - 1. First Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
  - 2. Second and Third Coats:
    - a. Sherwin Williams: ProMar 200 Zero VOC Latex Eg-Shel B20 Series
- C. Plaster and Gypsum Board Walls and Columns - Epoxy:
  - 1. First Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
  - 2. Second and Third Coats:
    - a. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- D. Existing Painted Plaster and Gypsum Board Walls and Columns - Epoxy:
  - 1. Sample Patch: Prepare a 36" x 36" minimum test area to see if a reaction occurs between existing and new finishes prior to proceeding with the specified work. If a reaction occurs, alert Architect and propose solution(s).
  - 2. First Coat: Barrier Coat Primer
    - a. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600 (bare spots and patches)
  - 3. Second and Third Coats:
    - a. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- E. Concrete Block - Sealer:
  - 1. First and Second Coats: Apply per manufacturer's recommendations.
    - a. United Coatings Inc; Canyon Tone Stain. Custom colored.
    - b. No substitutions shall be accepted.
- F. Masonry Block
  - 1. First Coat: Masonry block filler at rate not to exceed 100 sq. ft. per gal.
    - a. Sherwin Williams: Pro Mar Interior/Exterior Block Filler B25W25
  - 2. Second and Third Coats – Non-epoxy.
    - a. Semi-Gloss Latex Enamel Finish: Two (2) Coats over filled surface with total dry film thickness not less than 3.5 mils, excluding filler coat.
      - 1) Sherwin Williams: ProMar 200 Zero VOC Latex Semi-Gloss B31 Series
  - 3. Second and Third Coats - Epoxy.
    - a. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- G. Masonry Block and Concrete at pool environment:
  - 1. Surface preparation: Allow new concrete and mortar to cure a minimum of 14 days for Tnemec products, a minimum of 7 days for Wasser products. Brush-Blast or mechanically abrade removing laitance, curing agents, release compounds or other contaminants leaving surface profile similar to light/medium grit sandpaper. All surfaces must be clean, dry and free of oil, grease, dirt, dust or other foreign matter detrimental to the coating system.
  - 2. Prime (pre-fill) coat:
    - a. Sherwin Williams: Kem Cati-Coat Epoxy Block Filler.
  - 3. Intermediate Coat:
    - a. Sherwin Williams: Macropoxy 646 FC Epoxy @ 5-10 mils DFT.
  - 4. Finish Coat:
    - a. Sherwin Williams: One (1) coat Acrolon 218 HS Polyurethane @ 3-6 mils DFT.
- H. Existing Painted Masonry Block - Epoxy.

1. Sample Patch: Prepare a 36" x 36" minimum test area to see if a reaction occurs between existing and new finishes prior to proceeding with the specified work. If a reaction occurs, alert Architect and propose solution(s).
  2. First Coat: Barrier Coat Primer
    - a. Sherwin Williams: Loxon Masonry Primer A24W8300 (patches and bare spots)
  3. Second and Third Coats.
    - a. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- I. Poured Concrete Walls and Ceilings:
1. Preparation: Clean all concrete with 5% solution of muriatic acid and rinse thoroughly and allow to dry.
  2. First Coat:
    - a. Sherwin Williams: Loxon Masonry Primer A24W8300
  3. Second and Third Coats:
    - a. Sherwin Williams: ProMar 200 Zero VOC Latex Flat B30 Series.
- J. Concrete Floors - Epoxy:
1. Preparation:
    - a. Surfaces shall be clean and dry.
    - b. Mechanically abrade surface to achieve a texture of medium grade sandpaper.
    - c. Sweep or vacuum all residues.
  2. First Coat:
    - a. Sherwin Williams: Armorseal 33 Epoxy Primer Sealer
      - 1) Apply one coat of Armorseal 33 Epoxy Primer Sealer and spread at 200 sq. ft. per gallon.
      - 2) Allow 6 hours between coats.
  3. Second Coat:
    - a. Sherwin Williams: 650 SL/RC Self Leveling Recoatable 100% Solids Epoxy
      - 1) Apply one coat of 650 SL/RC and spread to 50-160 sq.ft. per gallon.
      - 2) Allow 24 hours for foot traffic – 7 days for full cure.
- K. Concrete Floors – Opaque Sealer:
1. Preparation:
    - a. Surfaces shall be clean and dry.
    - b. Mechanically abrade surface to achieve a texture of medium grade sandpaper.
    - c. Clean surfaces per ASTM Standard Practice D4258-83.
  2. First Coat and Second Coat:
    - a. Sherwin Williams, H&C Concrete Stain Solid Color Water-Based, or PPG Perma-Crete Color Seal WB Interior/Exterior Acrylic Concrete Stain.
      - 1) Apply minimum of 2 coats in strict accordance with manufacturer's written instructions.
- L. Existing Structural Glazed Facing Tile Walls and Existing Ceramic Tile Walls
1. Preparation:
    - a. Clean well with heavy duty degreaser.
    - b. Mechanically abrade to thoroughly remove gloss as recommended by the manufacturer of the epoxy wall paint.
  2. Primer, if recommended by the manufacturer:
    - a. Sherwin Williams: Adhesion Primer B51W8050
  3. First and Second Coats:
    - a. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- M. Acoustical Wood Fiber Panels and Cementitious Wood Fiber Deck - Non-bridging paint:
1. First and Second Coats: Apply per manufacturer's recommendations.
    - a. ProCoat Products, Inc.; ProCoustic Acoustical Tile and Ceiling Coating, custom color. Phone: 781-767-2270.
- N. Exposed Ceiling Construction - Dry Fall Paint.
1. Preparation: Spot prime any welds, etc.
  2. First Coat:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series



3. Second and Third Coats: (if deep tone colors are specified, the products below shall be factory mixed)
  - a. Sherwin Williams: Low VOC Waterborne Acrylic Dryfall Flat B42W81
- O. Ferrous, Galvanized Metals, Aluminum
  1. Preparation:
    - a. See Divisions 5 and 8 for requirements for priming of ferrous metals.
    - b. Do all touch up and priming of unprimed metals in accordance with requirements of Divisions 5 and 8.
  2. Apply paint in accordance with Steel Structure Painting Council Paint Application Specifications SSPC-PA1 to a dry film thickness as specified by the manufacturer.
  3. First Coat - Primer:
    - a. Ferrous metal (to be used even at shop primed items except as noted in Division 5):
      - 1) Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series
    - b. Galvanized metal after thorough cleaning per SSPC-SP1 with water soluble degreaser. No hydrocarbons.
      - 1) Sherwin Williams: ProCryl Universal Metal Primer B660310 Series
    - c. Aluminum:
      - 1) Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series
  4. Second and Third Coats:
    - a. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.
- P. Structural Steel, Interior Wet or Severe - Exposed:
  1. For warranty purposes, the Contractor shall insure that the specified primer in Division 5 "Structural Steel" and the intermediate and finish coats specified below are from the same manufacturer.
    - a. No coatings shall be applied until approved by the Architect and Owner's Representative.
  2. Prime Coat: Refer to Division 5, "Structural Steel."
  3. Intermediate Coat:
    - a. Sherwin Williams: One (1) coat Macropoxy 646 FC @ 5-10 mils DFT.
  4. Finish Coat:
    - a. Sherwin Williams: One (1) coat Acrolon 218 HS @ 3-6 mils DFT.
- Q. Galvanized Steel including galvanized decking and all steel in pool environments:
  1. For warranty purposes, the Contractor shall insure that the specified primer in Division 5 "Steel Deck" and the intermediate and finish coats specified below are from the same manufacturer.
    - a. No coatings shall be applied until approved by the Architect and Owner's Representative.
  2. Prime Coat: Refer to Division 5, "Steel Deck."
  3. Intermediate Coat:
    - a. Sherwin Williams: One (1) coat Macropoxy 646 FC @ 5-10 mils DFT.
  4. Finish Coat:
    - a. Sherwin Williams: One (1) coat Acrolon 218 HS @ 3-6 mils DFT.
- R. Painted Woodwork including any interior window sash and trim:
  1. Coordinate with "Interior Architectural Woodwork" Section to verify Scope of Work to be finished by Millwork Contractor.
    - a. First Coat:
      - 1) Sherwin Williams: Premium Wall & Wood Primer B28W8111
    - b. Second Coat:
      - 1) Sherwin Williams: ProMar 200 Interior Waterbased Acrylic-Alkyd B33W8251
- S. Natural Finished Woodwork:
  1. Coordinate with "Interior Architectural Woodwork" section to verify Scope of Work to be finished by Millwork Contractor.
    - a. First Step:

- 1) Wood Filler, applied as per manufacturer's instructions  
(Do not apply filler to open grained wood)
  - a) Benjamin Moore: Benwood Paste Wood Filler 238
  - b) Pratt & Lambert: Filler-Sealer
- b. Second Step: Stain, as needed to achieve color as per Architect; applied as per manufacturer's instructions. The following products or equal as approved by Architect:
  - 1) Sherwin Williams: Wood Classic 250 VOC Stain.
- c. Third Step: Sanding Sealer, if recommended by the manufacturer.
- d. Fourth Step: Two (2) Finish Coats
  - 1) Sherwin Williams: Wood Classic Waterborne Polyurethane Varnish, A68 Series.

## 2.6 MECHANICAL

- A. Apparatus, Equipment, and Equipment Supports
  1. First Coat:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series
  2. Second Coat:
    - a. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.
- B. Exposed Bare Piping, Valves, Fittings, and Hangers:
  1. First Coat:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
  2. Second Coat:
    - a. Benjamin Moore: Moorcraft Latex Semi Gloss 276
    - b. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.
- C. Exposed Insulation Piping, Valves, Fittings, and Hangers when canvas wrapped:
  1. First Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
  2. Second Coat:
    - a. Sherwin Williams: ProMar 200 Zero VOC Flat B30 Series.
- D. Insulated Ductwork and Piping with Canvas Covering Inc. Hangers for any kind of ductwork.
  1. One Brush Coat:
    - a. Pittsburgh Paints: 42-7, Speedhide Interior Fire Retardant Flat Latex.
- E. Grilles, Registers, and Diffusers
  1. First Coat:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
  2. Second and Third Coats:
    - a. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.
- F. Exterior Ductwork Exposed to Weather
  1. First Coat (Heavy coat of one of the following):
    - a. Sherwin Williams: Macropoxy 646 Fast Cure, B58-600/B58V600.
  2. Second and Third Coats (allow 24 hours drying time after first coat):
    - a. Sherwin Williams: Hi-Solids Polyurethane B65-300.

## 2.7 ELECTRICAL

- A. Exterior Exposed Electrical Conduit Fittings, Boxes, and other miscellaneous exterior electrical items.
  1. First Coat - Galvanized:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
  2. First Coat - Ferrous Metal:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
  3. Second and Third Coats:
    - a. Sherwin Williams: DTM Acrylic Gloss Coating (Water Reducible), B66 Series
- B. Interior Exposed Electrical Items in areas where walls and/or ceilings are painted including electrical panels, cabinets, exposed conduit, etc.
  1. First Coat - Galvanized:
    - a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
  2. First Coat - Ferrous Metal:

- a. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
3. Second and Third Coats:
  - a. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Concrete: 12 percent.
  2. Masonry (Clay and CMU): 12 percent.
  3. Wood: 15 percent.
  4. Gypsum Board: 12 percent.
  5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

**3.2 PREPARATION OF NEW SUBSTRATES**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Ferrous Metals, Galvanized Metal, Aluminum: Clean surfaces according to the Steel Structure Painting Council Surface Preparation Specifications: SSPC-SP1 Solvent Cleaning, SSPC-SP2 Hand Tool Cleaning, or SSPC-SP3 Power Tool Cleaning, as appropriate.
  1. Steel Substrates: Remove any rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
  2. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
    - a. Thoroughly clean galvanized metal per SSPC-SP1 with water soluble degreaser. No hydrocarbons.
  3. Aluminum Substrates: Remove surface oxidation.

- H. Wood Substrates:
  - 1. Refer to Division 6 Section "Finish Carpentry and Millwork" for preparation specified under other trades.
  - 2. Countersink all nails and finish with putty or plastic wood filler. Sand smooth when dried.
  - 3. Sand surfaces that will be exposed to view, and dust off.
  - 4. Prime edges, ends, faces, undersides, and backsides of wood.
  - 5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- J. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.3 **PREPARATION OF EXISTING SUBSTRATES**

- A. Preparation of Previously Painted Surfaces: Comply with requirements as specified for preparation of new substrates as well as the following:
  - 1. Scrub clean existing surfaces with a stiff brush and a solution of clean water and mild detergent.
  - 2. Scuff sand surface to allow new finish to hold.
  - 3. De-gloss painted surfaces in a manner appropriate to the substrate.
  - 4. Fill cracks, holes, voids and defects, and leave a smooth surface ready for application of primer.
  - 5. Remove loose paint and feather edges or patch as required to provide a smooth, seamless finish.
  - 6. Prepare a 36" x 36" minimum test area to see if a reaction occurs between existing and new finishes prior to proceeding with the specified work. If a reaction occurs, alert Architect and propose solution(s).

### 3.4 **PRIMING AND BACKPRIMING OF WOOD**

- A. All wood, factory finished or otherwise, must be back-primed immediately upon delivery with interior trim primer specified for wood which is to be painted, or finish manufacturer's recommended protective pre-treatment for wood which is to have natural finish.
- B. Apply first coat to all wood scheduled to receive natural finish before material is handled at the site by other trades.
- C. Furnish sealer to other trades for touching up any bare wood caused by mortising or butting of surfaces, or any kind of assembly or installation.
- D. Avoid painting over or otherwise staining edges of wood where natural finish is scheduled.

### 3.5 **APPLICATION**

- A. General: Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
    - a. Except where specifically authorized by the Architect to do otherwise: Apply flat or eggshell wall paint by brush or roller; apply gloss or semi-gloss with brush only.
  - 2. Sanding: In addition to preparatory sanding, fine sand between succeeding coats of all varnish enamel or flat enamel, using sandpaper appropriate to the finish. Use fine production paper between coats.
  - 3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 5. Doors: Finish all edges, including tops and bottoms, of wood and metal doors same as faces. Fill edges of exposed plywood doors, panels, similar materials.
  - 6. Finish interior of all closets and cabinets same as adjoining rooms, unless otherwise scheduled.

7. Apply one coat of sanding sealer and one coat of semi-gloss varnish to insides of all drawers unless otherwise specified.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. The number of coats scheduled are minimums.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  1. Holidays and restrikes in painted surfaces shall be considered sufficient cause to require recoating of entire surface.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
  1. Mechanical Work:
    - a. Uninsulated metal piping.
    - b. Uninsulated plastic piping.
    - c. Pipe hangers and supports.
    - d. Tanks that do not have factory-applied final finishes.
    - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  2. Electrical Work:
    - a. Switchgear.
    - b. Panelboards.
    - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

### 3.6 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
  1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  2. Testing agency will perform tests for compliance of paint materials with product requirements.
  3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

### 3.7 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

**END OF SECTION**

**SECTION 12 2413 – ROLLER SHADES****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes manual roller shades.
- B. Related Sections include the following:
  - 1. Division 06 Section "Rough Carpentry" for wood blocking and grounds.

**1.03 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.
- C. Full size sample for verification purposes of each type of window shade showing all components, materials, and finishes to be exposed to view. Prepare samples from same materials to be used for fabricating units.
- D. Samples for Verification:
  - 1. Complete, full-size operating unit not less than 16 inches (400 mm) wide for each type of roller shade indicated.
  - 2. Shade Material: Not less than 3 inches (80 mm) square, with specified treatments applied. Mark face of material.
  - 3. Valance: Full-size unit, not less than 12 inches (300 mm) long.
- E. Window Treatment Schedule: Include roller shades in schedule using same room designations indicated on Drawings.
- F. Product Certificates: For each type of roller shade product, signed by product manufacturer.
- G. Product Test Reports: For each type of roller shade product.
- H. Qualification Data: For Installer.
- I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining roller shades and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
  - 3. Operating hardware.
- J. Warranty: Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: An experienced installer who has completed installation of roller shades similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
  - 1. Provide a list of three institutional-quality window shade projects successfully completed within the last five years. For each project include the following:
    - a. Project/building name and location.
    - b. Description of scope.
    - c. Representative's name and phone number.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Corded Window Covering Product Standard: Provide roller shades complying with WCMA A 100.1.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver shades in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

**1.06 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide MechoShades as manufactured by MechoShade Systems, Inc or equal products by one of the following:
  - 1. Draper Shade and Screen Co., Inc.
  - 2. Solarfective Products, Ltd.
- B. Refer to roller shade schedule in Part 3.

**2.02 ROLLER SHADES**

- A. Shade Band Material - Translucent



1. Translucent Shades shall be light filtering, flame retardant, fade and soil resistant and washable.
    - a. Construction: 100% thermoplastic olefin
    - b. Openness Factor: 3 percent.
    - c. Meets Government Spec. #CCC-C-521-E.
    - d. Type I product
    - e. Weight: Must be a minimum of 6.4 oz. per square yard.
    - f. Color: As selected by Architect from manufacturer's full range.
      - 1) Design Intent: Grey and white.
  2. Provide EcoVeil 1550 Series ShadeCloth as manufactured by MechoShade Systems or equal products by one of the following:
    - a. Draper Shade and Screen Co., Inc.
    - b. Solarfective Products, Ltd.
- B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with removable spline fitting integral channel in tube Provide capacity for one roller shade band per roller, unless otherwise indicated on Drawings.
- C. Direction of Roll: Regular, from back of roller.
- D. Mounting Brackets: Galvanized or zinc-plated steel.
- E. Roller Shades, Non-Pocket-Style:
1. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as indicated on Drawings or in a window treatment schedule; removable design for access.
  2. Top/Back Cover: L shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- F. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide exposed-to-view, external-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- G. Shade Operation:
1. Manual: Provide with spring roller continuous loop bead chain, clutch, and cord tensioner and bracket lift operator.
    - a. Position of Clutch Operator: Left or Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated on Drawings or in a window treatment schedule.
    - b. Clutch: Capacity to lift size and weight of shade; sized to fit roller or provide adaptor.
    - c. Lift Assist Mechanism: Manufacturer's standard spring assist for balancing roller shade weight and lifting heavy roller shades.
    - d. Loop Length: Length required to make operation convenient from floor level.
    - e. Bead Chain: Nickel-plated metal or stainless steel.
    - f. Operating Function: Stop and hold shade at any position in ascending or descending travel.
- H. Valance: Style matching hem; as indicated by manufacturer's designation color or as indicated in a window treatment schedule.

- I. Mounting: As indicated on Drawings, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

## **2.03 ROLLER SHADE FABRICATION**

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
  1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
  2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- G. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range.

## **2.04 WARRANTY**

- A. Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 ROLLER SHADE INSTALLATION**

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Connections: Connect motorized operators to building electrical system.

### **3.03 ADJUSTING**

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

### **3.04 CLEANING AND PROTECTION**

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

### **3.05 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

### **3.06 ROLLER SHADE SCHEDULE**

- A. Type A            Shade Band Material: Translucent  
                          Operation: Manual  
                          Installation: Non-pocket style

### **END OF SECTION**



## SECTION 26 0010 - ELECTRICAL GENERAL REQUIREMENTS

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

#### 1.02 SUMMARY

- A. This Section includes electrical general administrative and procedural requirements. The following requirements are included in this Section to supplement the requirements specified in Division 1 Specification Sections.

#### 1.03 REFERENCES

- A. All materials shall be new. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standard Specifications of the following recognized authorities:
1. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  2. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
  3. CSI - Construction Specifications Institute (The); [www.csiresources.org](http://www.csiresources.org).
  4. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
  5. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
  6. NEC - National Electrical Code
  7. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).

- a. NECA 1-2000, "Practices for Good Workmanship in Electrical Contracting (ANSI)."
- 8. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
- 9. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
- 10. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).

#### **1.04 QUALITY ASSURANCE**

- A. Scope of Work: Furnish all labor, material, equipment, technical supervision, and incidental services required to complete, test and leave ready for operation the electrical systems as specified in the Division 26 Sections and as indicated on Drawings.
  - 1. Contract Documents are complimentary, and what is required by one shall be as binding as if required by all. In the event of inconsistencies or disagreements within the Construction Documents bids shall be based on the most expensive combination of quality and quantity of the work indicated.
  - 2. The Contractor understands that the work herein described shall be complete in every detail.
- B. Ordinances and Codes: Perform all Work in accordance with applicable Federal, State and local ordinances and regulations, the Rules and Regulations of NFPA, NECA, and UL, unless otherwise indicated.
  - 1. Notify the Architect/Engineer before submitting a proposal should any changes in Drawings or Specifications be required to conform to the above codes, rules or regulations. After entering into Contract, make all changes required to conform to above ordinances, rules and regulations without additional expense to the Owner.
- C. Source Limitations: All equipment of the same or similar systems shall be by the same manufacturer.
- D. Tests and Inspections: Perform all tests required by state, city, county and/or other agencies having jurisdiction. Provide all materials, equipment, etc., and labor required for tests.
- E. Performance Requirements: Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the trades involved.
- F. Sequence and Schedule: Work so as to avoid interference with the work of other trades. Be responsible for removing and relocating any work which in the opinion of the Owner's Representatives causes interference.

#### **1.05 CODES, PERMITS AND FEES**

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the Contractor. All work shall conform to all applicable codes, rules and regulations.
- B. Rules of local utility companies shall be complied with. Coordinate with the utility company supplying service to the installation and determine all devices including, but not limited to, all current and potential transformers, meter boxes, C.T. cabinets and meters which will be required and include the cost of all such items and all utilities costs in proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed Drawings or diagrams which may be required by the governing authorities. Where the Drawings and/or Specifications indicate materials or construction in excess of code requirements, the Drawings and/or Specifications shall govern.

#### **1.06 DRAWINGS**

- A. The Drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the Drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.
- C. Deviations from the Drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.

- D. The architectural and structural Drawings take precedence in all matters pertaining to the building structure, mechanical Drawings in all matters pertaining to mechanical trades and electrical Drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the Drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.
- E. Drawings are not intended to be scaled for rough-in or to serve as shop drawings. Take all field measurements required to complete the Work.

#### **1.07 MATERIAL AND EQUIPMENT MANUFACTURERS**

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of electrical equipment and shall be of the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment or product provided shall be equal in size, quality, durability, appearance, capacity, and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Items Requiring Prior Approval specified in this section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, electrical work, and building alterations shall be included in the original Bid. Similar equipment shall be by one manufacturer.
- C. Where existing equipment is modified to include new switches, circuit breakers, metering or other components, the new components shall be by the original equipment manufacturer and shall be listed for installation in the existing equipment. Where original equipment manufacturer components are not available, third party aftermarket components shall be listed for the application and submitted to the engineer for approval. Reconditioned or salvaged components shall not be used unless specifically indicated on the drawings.

#### **1.08 INSPECTION OF SITE**

- A. Visit the site, examine and verify the conditions under which the Work must be conducted before submitting Proposal. The submitting of a Proposal implies that the Contractor has visited the site and understands the conditions under which the Work must be conducted. No additional charges will be allowed because of failure to make this examination or to include all materials and labor to complete the Work.

#### **1.09 ITEMS REQUIRING PRIOR APPROVAL**

- A. Bids shall be based upon manufactured equipment specified. All items that the Contractor proposes to use in the Work that are not specifically named in the Contract Documents must be submitted for review prior to bids. Such items must be submitted in compliance with Division 1 specifications. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
  - 1. Equipment to be considered for prior approval shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall fulfill the requirements of equipment arrangement and space limitations of the equipment shown on the plans and/or specified and shall be compatible with the other components of the system.
  - 2. All costs incurred to make equipment comply with other requirements, including providing maintenance, clearance, electrical, replacement of other components, and building alterations shall be included in the original bid.

- B. Voluntary alternates may be submitted for consideration, with listed addition or deduction to the bid.

#### **1.10 SHOP DRAWINGS/SUBMITTALS**

- A. Submit project-specific submittals for review in compliance with Division 1.
- B. All shop Drawings shall be submitted in groupings of similar and/or related items (lighting fixtures, switchgear, etc.). Incomplete submittal groupings will be returned unchecked.
- C. If deviations (not substitutions) from Contract Documents are deemed necessary by the Contractor, details of such deviations, including changes in related portions of the project and the reasons therefore, shall be submitted with the submittal for approval.
- E. Submit for approval shop drawings for electrical systems or equipment indicated in other sections of electrical specs. Where items are referred to by symbolic designation on the Drawings and Specifications, all submittals shall bear the same designation.

#### **1.11 COORDINATION DRAWINGS**

- A. Submit project specific coordination drawings for review in compliance with Division 1 Specification Sections.

#### **1.12 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS**

- A. Submit project specific Operation and Maintenance Instructional Manuals for review in compliance with Division 01 Specification Sections.
- B. Provide complete operation and maintenance instructional manuals covering all electrical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Manual shall be provided on electronic media. All literature shall be combined in one document and shall be properly bookmarked with all applicable sections. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.
- C. The operating and maintenance instructions shall include a brief, general description for all electrical systems including, but not limited to:
  - 1. Routine maintenance procedures.
  - 2. Trouble-shooting procedures.
  - 3. Contractor's telephone numbers for warranty repair service.
  - 4. Submittals.
  - 5. Recommended spare parts list.
  - 6. Names and telephone numbers of major material suppliers and subcontractors.
  - 7. System schematic drawings on 8-1/2" x 11" sheets.

#### **1.13 RECORD DRAWINGS**

- A. Submit record drawings in compliance with Division 01.
- B. Contractor shall submit to the Architect/Engineer, record drawings on electronic media which have been neatly marked to represent as-built conditions for all new electrical work. Modifications to original drawings shall be clearly marked with a contrasting color so the marks are readily apparent.
- C. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect, Engineer and Owner at their request during the course of construction.

#### **1.14 INSTRUCTION OF OWNER PERSONNEL**

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of electrical equipment and systems at agreed upon times. A minimum of 8 hours of formal instruction to Owner's personnel shall be provided for each building. Additional hours are specified in individual specification sections.
- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.



- C. In addition to individual equipment training provide overview of each electrical system. Utilize the as-built documents for this overview.
- D. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction, or as requested by Owner.

#### **1.15 WARRANTY**

- A. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the electrical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this electrical installation which becomes defective within a period of one year (unless specified otherwise in other Division 26 sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.
- B. Contractor shall be responsible for any temporary services including equipment and installation required to maintain operation as a result of any equipment failure or defect during warranty period.
- C. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### **1.16 USE OF EQUIPMENT**

- A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Do not use Owner's lamps for temporary lighting except as allowed and directed by the Owner. Equip lighting fixtures with new lamps when the project is turned over to the Owner.

#### **1.17 COORDINATION**

- A. Coordinate arrangement, mounting, and support of electrical equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.
  - 4. To ensure that connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions; and to maintain the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."
- D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

### **PART 2 PRODUCTS (NOT APPLICABLE)**

### **PART 3 EXECUTION**

#### **3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION**

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to raceways and piping systems installed at a required slope.

### **3.02 DEMOLITION WORK**

- A. All demolition of existing electrical equipment and materials will be done by this Contractor unless otherwise indicated. Include all items such as, but not limited to, electrical equipment, devices, lighting fixtures, conduit, and wiring called out on the Drawings and as necessary whether such items are actually indicated on the Drawings or not in order to accomplish the installation of the specified new work.
- B. In general, demolition work is indicated on the Drawings. However, the Contractor shall visit the job site to determine the full extent and character of this work.
- C. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises.
- D. Where equipment or fixtures are removed, outlets shall be properly blanked off, and conduits capped. After alterations are done, the entire installation shall present a "finished" look, as approved by the Architect/Engineer. The original function of the present electrical work to be modified shall not be changed unless required by the specific revisions to the system as specified or as indicated.
- E. Reroute signal wires, lighting and power wiring as required to maintain service. Where walls and ceilings are to be removed as shown on the Drawings, the conduit is to be cut off by the Electrical Trades so that the abandoned conduit in these walls and ceilings may be removed with the walls and ceilings by the Architectural Trades. All dead-end conduit runs shall be plugged at the remaining line outlet boxes or at the panels.
- F. Where new walls and/or floors are installed which interfere with existing outlets, devices, etc., the Electrical Trades shall adjust, extend and reconnect such items as required to maintain continuity of same.
- G. All electrical work in altered and unaltered areas shall be run concealed wherever possible. Use of surface raceway or exposed conduits will be permitted only where approved by the Architect/Engineer.

### **3.03 INSTALLATION OF EQUIPMENT**

- A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the Drawings and Specifications, report such conflicts to the Architect/Engineer for resolution.
- B. Device Location:
  - 1. Allow for relocation prior to installation of wiring devices and other control devices, for example, receptacles, switches, fire alarm devices, and access control devices, within a 10-foot radius of indicated location without additional cost.

### **3.04 WORK IN EXISTING BUILDINGS**

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once Work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed Work. Promptly repair any damage to same at Contractor's expense.

- C. Consult with the Owner's Representative as to the methods of carrying on the Work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's Representative.

### **3.05 TEMPORARY SERVICES**

- A. Provide and remove upon completion of the project, in accordance with the general conditions and as described in Division 01, a complete temporary electrical and telephone service during construction.

### **3.06 DISPOSAL**

- A. Fluorescent Lamps
  - 1. Fluorescent lamps are known to contain mercury and are classified as hazardous material. All fluorescent lamps shall be assumed to contain mercury unless tested and confirmed otherwise with a toxicity characteristic leaching procedure (TCLP).
  - 2. Hazardous materials (fluorescent lamps), shall be sent to a lamp recycling facility. The materials shall be properly packaged with labels that meet the Department of Transportation Regulations and stored in a secure location prior to transportation.
  - 3. The Contractor shall identify the costs of the lamp disposal process including, but not limited to, the lamp packaging, storage, transportation, disposal, and any profile fees.
  - 4. At the completion of the project, provide documentation to verify that the lamps have been properly disposed of in accordance with all local, state and federal guidelines.
- B. Ballasts
  - 1. Lighting ballasts manufactured prior to 1979 have been known to contain polychlorinated biphenyls (PCBs). Unless specifically noted on the ballast as containing "No PCBs," the ballast shall be assumed to contain components with PCB materials.
  - 2. Hazardous materials (ballasts with PCBs), shall be disposed of at a hazardous waste incineration facility, or at a recycling facility in accordance with the Code of Federal Regulations as administered by the EPA in regards to this issue. The ballasts shall be packaged/stored in fifty-five gallon steel drums with labels that meet the Department of Transportation Regulations.
  - 3. The Contractor shall identify the costs of the ballast disposal process including, but not limited to, the packaging, storage, transportation, disposal, and any profile fees.
  - 4. Provide at completion of the project documentation (manifests) to verify that the ballasts have properly been disposed of in accordance with all local, state and federal guidelines.

### **3.07 CHASES AND RECESSES**

- A. Provided by the architectural trades, but the Contractor shall be responsible for their accurate location and size.

### **3.08 CUTTING, PATCHING AND DAMAGE TO OTHER WORK**

- A. Refer to General Conditions for requirements.
- B. All cutting, patching and repair work shall be performed by the Contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

### **3.09 EQUIPMENT CONNECTIONS**

- A. Make connections to equipment and other items included in the work in accordance with the approved shop Drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the Drawings, but called out by the equipment manufacturer's shop Drawings shall be provided.

### **3.10 CLEANING**

- A. All debris shall be removed daily as required to maintain the work area in a neat, orderly condition.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

### **3.11 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS**

- A. Equipment and materials shall be protected from theft, injury or damage.
- B. Protect conduit openings with temporary plugs or caps.
- C. Provide adequate storage for all equipment and materials delivered to the job site. Location of the space will be designated by the Owner's representative or Architect/Engineer. Equipment set in place in unprotected areas must be provided with temporary protection.

### **3.12 EXTRA WORK**

- A. For any extra electrical work which may be proposed, this Contractor shall furnish to the General Contractor, an itemized breakdown of the estimated cost of the materials and labor required to complete this work. The Contractor shall proceed only after receiving a written order from the General Contractor establishing the agreed price and describing the work to be done. Prior to any extra work which may be proposed, the Electrical Contractor shall submit unit prices (same prices for increase/decrease of work) for the following items: 1/2", 3/4", 1", 1-1/2" conduit; #12, #10, #8, #6, #2 wire; receptacle, I.G. receptacle, data box, V4000 wiremold, fire alarm combination visual/audible notification appliance, fire alarm visual notification appliance, clock, or other devices which may be required for any proposed extra work.

### **3.13 DRAWINGS AND MEASUREMENTS**

- A. The Drawings are not intended to be scaled for rough-in measurements nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement are the Contractor's responsibility. The Contractor shall check latest Architectural Drawings and locate light switches from same where door swings are different from Electrical Drawings.

### **END OF SECTION**

## SECTION 26 0519 - CONDUCTORS AND CABLES

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. Section includes:
  - 1. Building wires and cables rated 600V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

#### 1.03 SUBMITTALS

- A. Field Quality-Control Test Reports
- B. Submit letter of compliance (intent) for general building wire and cable. Provide product data for the following:
  - 1. Metal-Clad Cable, Type MC

#### 1.04 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

### PART 2 PRODUCTS

#### 2.01 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Conductor Insulation:
  - 1. Type THHN/THWN-2: Comply with UL 83.
  - 2. Type THW/THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

3. Type XHHW-2: Comply with UL 44.

## **2.02 METAL-CLAD CABLE, TYPE MC**

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers:
1. AFC Cable Systems
  2. Alpha Wire Company
  3. American Bare Conductor
  4. Belden
  5. Encore
  6. General Cable
  7. Okonite
  8. Service Wire Co.
  9. Southwire Company
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  2. Comply with UL 1569.
  3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
1. Single circuit and multi-circuit with color-coded conductors for branch circuit distribution.
  2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors:
1. Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- F. Ground Conductor: Insulated. Ground conductor sized as indicated on drawings (reduced ground conductor is not acceptable).
- G. Conductor Insulation:
1. Type TFN/THHN/THWN-2: Comply with UL 83.
  2. Type XHHW-2: Comply with UL 44.
- H. Armor: Aluminum, interlocked.

## **2.03 CONNECTORS AND SPLICES**

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## **PART 3 EXECUTION**

### **3.01 CONDUCTOR MATERIAL APPLICATIONS**

- A. Refer to application schedule on the drawings
- B. Feeders and Branch Circuits: Solid or stranded for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. Each feeder shall be of the same conductor and insulation material (phase, neutral, and parallel).
- D. Use conductor not smaller than 14 AWG for control circuits,
- E. Where equipment is listed for use with copper conductors only, use copper conductors for the entire length of feeder.

### **3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS**

- A. Refer to application schedule on the drawings
- B. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel wire-mesh strain relief device at terminations to suit application.
- C. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable.
- D. Class 1 Control Circuits: Type THHN/THWN-2, in raceway.

- E. Class 2 Control Circuits: Type THHN/THWN-2, in raceway.

### **3.03 INSTALLATION OF CONDUCTORS AND CABLES**

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 0533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- G. Support communication cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- I. Provide a separate neutral conductor for each circuit unless multi-wire branch circuits are specifically indicated on the drawings.
- J. Electrical Contractor shall be responsible for de-rating of conductors as required by N.E.C. when more than three current carrying conductors are installed in a single raceway or cable. Neutral conductors shall be considered current carrying conductors.
- K. Type MC cable shall be supported and secured at intervals not exceeding 4'-0" in new construction
- L. MC cable shall not be used for home runs to receptacle or distribution panels.
- M. Where MC cable is permitted by the specifications, MC cable shall not be bundled.
- N. Between support, hangers and termination no more than 3" deflection from the bottom of the cable to a horizontal line between the support/hanger or termination.
- O. Do not route conductors across roof without prior approval from engineer.

### **3.04 CONNECTIONS**

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
- D. Clean conductor surfaces before installing lugs and connectors.
- E. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- F. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and larger.
- G. Use Sta-Kon connectors to terminate stranded conductors #10 AWG and smaller to screw terminals.
- H. Use insulated spring wire connectors with plastic caps (wire nuts) for copper conductor splices and taps, 10 AWG and smaller. Push-in style connectors are not permitted.
- I. Provide lugs suitable for bussing and conductor material used.

### **3.05 IDENTIFICATION**

- A. Identify and color-code conductors and cables according to Section 26 0553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### **3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0533 "Raceways and Boxes."

### **3.07 FIRESTOPPING**

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping".

### **3.08 FIELD QUALITY CONTROL**

- A. Perform the following field quality control tests in accordance with Division 26 section "Electrical Testing"
  - 1. Description: Test all feeders rated 100 A and above.
  - 2. Visual and Mechanical Inspection
    - a. Inspect cables for physical damage and proper connection in accordance with the one line diagram.
    - b. Test cable mechanical connections with an infrared survey.
    - c. Check cable color-coding against project Specifications and N.E.C. requirements.
  - 3. Electrical Tests
    - a. Perform continuity test to insure proper cable connection.
- B. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

### **END OF SECTION**



**SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

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**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.

**1.03 DEFINITIONS**

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

**1.05 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Steel slotted support systems.
  - 2. Nonmetallic slotted support systems.

**1.06 QUALITY ASSURANCE**

- A. Comply with NFPA 70.

**1.07 COORDINATION**

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

**PART 2 PRODUCTS**

**2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS**

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International..

- b. B-Line, by Eaton..
  - c. GS Metals Corp.
  - d. Pentair Electrical & Fastening Solutions.
  - e. Thomas & Betts Corporation.
  - f. Unistrut; a part of Atkore International.
  - g. Wesanco, Inc.
- 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
- 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti Inc.
      - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 3) MKT Fastening, LLC.
      - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
  - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) B-Line by Eaton.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti Inc.
      - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  - 6. Toggle Bolts: All-steel springhead type.
  - 7. Hanger Rods: Threaded steel.

### **PART 3 EXECUTION**

#### **3.01 APPLICATION**

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with:
    - a. Two-bolt conduit clamps
    - b. Single-bolt conduit clamps
    - c. Single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Support single runs of MC cable using spring-steel clamps from suspended ceiling hangers, hanger wire or building structure at intervals not to exceed three feet. Do not support MC cable from ceiling grid.

### **3.02 SUPPORT INSTALLATION**

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
  - 6. To Steel:
    - a. Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
    - b. Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
    - c. Spring-tension clamps.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel support systems attached to substrate.
- E. Slotted support systems applications:
  - 1. Indoor dry and damp Locations: Painted Steel
  - 2. Outdoors and interior wet locations: Galvanized Steel
  - 3. Corrosive Environments, including pool equipment rooms: Nonmetallic
- F. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- G. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- H. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- I. Obtain permission from Architect/Engineer before drilling or cutting structural members.
- J. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

- K. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- L. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- M. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- N. The Contractor shall replace all supports and channels that sag, twist, and/or show signs of not providing proper structural support, to the equipment, it is intended for, as determined by the Owner and Architect/Engineer. All costs associated with replacing supports and steel channels shall be incurred by the Contractor.

**3.03 PAINTING**

- A. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION**

## SECTION 26 0533 - RACEWAYS AND BOXES

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
1. Division 07 Section, "Penetration Firestopping" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
  2. Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings, and for access floor boxes and service poles.
  3. Division 26 "Hangers and Supports for Electrical Systems" for concrete bases.

#### 1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. PVC: Polyvinyl Chloride.
- F. HDPE: High Density Polyethylene.

#### 1.04 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

#### 1.05 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

## **PART 2 PRODUCTS**

### **2.01 METAL CONDUIT AND TUBING**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Alflex Inc.
  - 3. Allied Tube Triangle Century.
  - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 5. International Metal Hose.
  - 6. Electri-Flex Co
  - 7. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
  - 8. LTV Steel Tubular Products Company – Manhattan/CDT/Cole-Flex.
  - 9. Maverick.
  - 10. O-Z Gedney; unit of General Signal.
  - 11. Wheatland.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT: ANSI C80.3.
- E. FMC: Zinc-coated steel or aluminum.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: Steel, compression type.
  - 2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

### **2.02 FIRE ALARM EMT**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Allied Tube Triangle Century.
- B. EMT conduit with bright red topcoat; Fire Alarm EMT.
- C. EMT and Fittings: ANSI C80.3.

### **2.03 NONMETALLIC CONDUIT AND TUBING**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American International.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Arnco Corp.
  - 4. Cantex Inc.
  - 5. Certainteed Corp.; Pipe and Plastics Group.
  - 6. Condux International.
  - 7. ElecSys, Inc.
  - 8. Electri-Flex Co.
  - 9. Integral.
  - 10. Kor-Kap.
  - 11. Lamson and Sessions: Carlon Electrical Products.
  - 12. Manhattan/CDT/Cole-Flex.
  - 13. RACO; Division of Hubbell, Inc.
  - 14. Scepter.
  - 15. Spiraldut, Inc./AFC Cable Systems, Inc.
  - 16. Thomas & Betts Corporation.
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

- D. ENT and RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.
- E. LFNC: UL 1660.
- F. HDPE: UL 651, ASTM D 3350, ASTM D 1248 Schedule 40.
- G. RTRC: Comply with UL 2515A and NEMA TC 14.

## **2.04 SURFACE RACEWAYS**

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Airey-Thompson Sentinel Lighting: Wiremold Company (The).
    - b. Thomas & Betts Corporation.
    - c. Walker Systems, Inc.; Wiremold Company (The).
    - d. Wiremold Company (The); Electrical Sales Division.
    - e. Mono-Systems, Inc.
- B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

## **2.05 BOXES, ENCLOSURES, AND CABINETS**

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1. Shall be used within walls or ceiling.
- B. Floor Boxes: Cast metal, fully adjustable, rectangular.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

# **PART 3 EXECUTION**

## **3.01 RACEWAY APPLICATION**

- A. Provide raceways in interior and exterior locations in accordance with the "Raceway Application Matrix" included on the drawings.
- B. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
  - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
  - 3. EMT: Use setscrew or compression, cast-metal fittings. Comply with NEMA FB 2.10.
  - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

## **3.02 INSTALLATION**

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Install temporary closures to prevent foreign matter from entering raceways.
- F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

- G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- H. Install no more than the equivalent of four 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
  - 1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- J. Support conduit within 12 inches of enclosures to which attached.
- K. Raceways Embedded in Slabs:
  - 1. Raceways embedded in slabs shall be limited to above grade concrete decks. Embedded conduit shall be limited to servicing floor boxes and equipment located in open spaces away from accessible walls.
  - 2. Install in middle 1/3 of slab thickness where practical and leave at least 2 inches (50 mm) of concrete cover.
  - 3. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
  - 4. Space raceways laterally to prevent voids in concrete.
  - 5. Run conduit larger than 1-inch trade size (DN 27) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 6. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 7. Conduits shall run flat. Do not allow conduits to cross.
  - 8. Change from non-metallic raceway to EMT before turning up out of the concrete and rising above the floor.
- L. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
  - 1. Run parallel or banked raceways together on common supports.
  - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- Q. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- R. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- S. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- U. Provide pull string and 25% spare capacity in every branch circuit conduit.



- V. Communications and Signal Cabling Systems Raceways: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
  - 1. Electrical conduit (LB's) are not permitted.
  - 2. Conduits shall have no more than two 90 degree bends between pull points or pull boxes.
  - 3. Conduits shall contain no continuous sections longer than 150 ft. without a pull point/box.
  - 4. Conduit for fiber cabling shall have a bend radius of at least 10 times the internal diameter.
  - 5. Conduit for copper cabling less than 2" shall have a bend radius of at least 6 times the internal diameter. Conduit for copper cabling 2" and larger shall have a bend radius of at least 10 times the internal diameter.
  - 6. All conduit ends shall have an insulated bushing.
- W. Flexible Conduit Connections: Comply with NEMA RV3. Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- X. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals. Provide cover clips to cover space between connecting pieces.
- Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- AA. Locate boxes so that cover or plate will not span different building finishes.
- BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- DD. Set floor boxes level and flush with finished floor surface. Trim non-metallic boxes after installation to fit flush with finished floor surface.
- EE. Route conduits in finished areas with exposed ceilings at underside of structural deck or as high as possible.

### **3.03 SLEEVE INSTALLATION FOR ELECTRICAL AND COMMUNICATIONS PENETRATIONS**

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
  - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."

### **3.04 FIRESTOPPING**

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Through-Penetration Firestop Systems."

### **3.05 PROTECTION**

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### **3.06 CLEANING**

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

### **END OF SECTION**

## SECTION 26 0553 - ELECTRICAL IDENTIFICATION

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes the following:
1. Identification for raceway and metal-clad cable.
  2. Identification for conductors and communication and control cable.
  3. Warning labels and signs.
  4. Instruction signs.
  5. Equipment identification labels.
  6. Miscellaneous identification products.

#### 1.03 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with 29 CFR 1910.145.

#### 1.04 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

### PART 2 PRODUCTS

#### 2.01 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color for Printed Legend:
1. Power Circuits: Black letters on an orange field.
  2. Legend: Indicate system or service and voltage, if applicable.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

## **2.02 CONDUCTOR, COMMUNICATION AND CONTROL CABLE IDENTIFICATION MATERIALS**

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

## **2.03 WARNING LABELS AND SIGNS**

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
  - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

## **2.04 EQUIPMENT IDENTIFICATION LABELS**

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Black letters on a white background. Minimum letter height shall be 3/8 inch.
- B. Outdoor Equipment Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

## **2.05 MISCELLANEOUS IDENTIFICATION PRODUCTS**

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength: 50 lb, minimum.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black, except where used for color-coding.
- B. Paint: Paint materials and application requirements are specified in Division 9 painting Sections.
- C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## **2.06 WIRING DEVICE IDENTIFICATION**

- A. Description: Self adhesive label with black upper case letters on clear polyester label, font size 7.

# **PART 3 EXECUTION**

## **3.01 APPLICATION**

- A. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands:
  - 1. Fire Alarm System: Red.
  - 2. Security System: Blue and yellow.
  - 3. Telecommunication System: Green and yellow.
  - 4. Control Wiring: Green and red.
- B. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use marker tape. Identify each ungrounded conductor according to source and circuit number as indicated on Drawings. Identify control circuits by control wire number as indicated on shop drawings.
- C. Branch-Circuit Conductor Identification: Mark junction box covers in indelible ink with the panel and breaker numbers of other circuits contained within.
- D. Conductor Identification: Locate at each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection or termination point.
- E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.
  2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
    - a. Indoor Equipment: Engraved, laminated acrylic or melamine label mechanically secured.
    - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
  2. Equipment to Be Labeled: If included on project. All items may not be on project.
    - a. Panelboards, electrical cabinets, and enclosures.
    - b. Access doors and panels for concealed electrical items.
    - c. Emergency system boxes and enclosures.
    - d. Disconnect switches.
    - e. Push-button stations.
    - f. Power transfer equipment.
    - g. Remote-controlled switches, dimmer modules, and control devices.
- H. Wiring Device Identification Labels: On each faceplate install circuit designation label that is consistent with panelboard directories, and as-built plan drawings. Apply labels to receptacle faceplates centered below bottom outlet. Apply labels to toggle switch faceplates on backside.

### **3.02 INSTALLATION**

- A. Verify identity of each item before installing identification products.
- B. Location:
  1. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
  2. Conduit Markers: Provide identification for each power conduit containing conductors rated 400A or greater.
- C. Apply identification devices to surfaces after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

- F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
  2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
    - d. Grounded Conductor (Neutral): White.
  3. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
    - d. Ground Conductor (Neutral): Grey.
  4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- H. Label information arrangement for 3 lines of text.
1. Line one shall describe the panel or equipment. Line one example: "DP-XX," RP-XX," "T-XX," "EF-XX," etc.
  2. Line two shall describe the first disconnecting means feeding this panel or equipment. Line two example: "Fed from DP-XX," "Fed from RP-XX," etc.
  3. Line three indicates that location of the disconnecting means as identified in line two. Line three example: "First Floor Elect. Rm #XXX."
  4. Line four shall include "Via T-XX" when panel or equipment is fed from a transformer.
- I. Examples:

|   |   |   |
|---|---|---|
| RP-1A<br>FED FROM DP-1A<br>ELECTRICAL ROOM A100<br>VIA T-1A | EF-1<br>FED FROM MCC-1A<br>MECHANICAL ROOM F101 | LP-1A<br>LOCATED IN<br>ELECTRICAL ROOM A100 |
|---|---|---|

- J. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.
- K. Degrease and clean surface to receive nameplates.
- L. Install nameplate and labels parallel to equipment lines.
- M. Secure nameplate to equipment front using screws.
- N. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- O. Identify conduit using field painting where required.
- P. Paint bands 10 feet on center, and 4 inches minimum in width.

**END OF SECTION**

## SECTION 26 2726 - WIRING DEVICES

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes the following:
1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
  2. Single- and double-pole snap switches and dimmer switches.
  3. Device wall plates.
  4. Pin and sleeve connectors and receptacles.
  5. Floor service fittings, poke-through assemblies, access floor boxes, and service poles.

#### 1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.  
B. GFCI: Ground-fault circuit interrupter.  
C. PVC: Polyvinyl chloride.  
D. RFI: Radio-frequency interference.  
E. TVSS: Transient voltage surge suppressor.  
F. UTP: Unshielded twisted pair.

#### 1.04 REFERENCES

- A. DSCC W-C-596G: Federal Specification Connector, Electrical, Power, General Specification.  
B. DSCC W-C-896F: Federal Specification Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).  
C. IEC 309-1, Part 1: General Requirements: Plugs, Socket-Outlets and Couplers for Industrial Purposes  
D. NEMA FB 11: Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations.  
E. NEMA WD 1: General Requirements for Wiring Devices.  
F. NEMA WD 6: Wiring Device – Dimensional Requirements.

- G. UL 20: General-Use Snap Switches.
- H. UL 486A: Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- I. UL 486B: Wire Connectors for Use with Aluminum Conductors.
- J. UL 498: Electrical Attachment Plugs and Receptacles.
- K. UL 943: Ground Fault Circuit Interrupters.

#### **1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations for each type of product indicated.
- B. Qualification Data: For testing agency.

#### **1.06 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70.

#### **1.07 COORDINATION**

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and Plug Sets: Match equipment requirements.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

#### **2.02 RECEPTACLES**

- A. All receptacles shall be tamper resistant (adjust model numbers listed below as required).
- B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
- C. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498. Configuration 5-20R duplex receptacle.
  - 1. Manufacturers:
    - a. Hubbell Incorporated; Wiring Device-Kellems HBL 5362.
- D. Self-Test GFCI's: Duplex GFCI Convenience Receptacles, 125 V, 20 A. Comply with NEMA WD1, NEMA WD6 configuration 5-20R, UL 498, Federal Specification W-C-596 and UL 943, Class A, and include indicator light that is lighted when device is tripped. Must have self-test feature and SafeLock protection™: conducts an automatic test every second, ensuring its always ready to protect. If the device fails the self-test, the indicator light flashes to signal that the GFCI should be replaced. With SafeLock Protection™, if critical components are damaged and ground fault protection is lost, power to receptacle must be discontinued.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work, include, but are not limited to the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pass & Seymour/LeGrand; Wiring Devices Division: 2096.
    - b. Hubbell equal.
- E. Industrial Heavy-Duty Pin and Sleeve Devices: Comply with IEC 309-1.



- F. Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.

## **2.03 WALL SWITCHES**

- A. Manufacturers:
1. Hubbell Incorporated; Wiring Device-Kellems 1220 Series.
- B. Device body: Plastic toggle handle.
- C. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
- D. Provide single-pole, two-pole, three-way and four-way switches as indicated.
- E. Provide pilot light where indicated.
- F. Provide key type where indicated. Furnish a minimum of six keys to Owner.
1. Switch shall be Hubbell 1220 series (or equal as specified above) with locking cover plate.
  2. Cover plate shall be Hubbell HBL96062, straight keyed cylinder type lock, with stainless steel finish.
- G. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
1. Switch: 20 A, 120/277-V ac.
  2. Receptacle: NEMA WD 6, Configuration 5-20R.

## **2.04 DIGITAL TIME SWITCHES**

- A. General:
1. Watt Stopper TS-400 or equal. Operation on 100 to 300 volts.
  2. Digital time switch turns lights off automatically after pre-set time. Pushbutton operation with time setting from 5 minutes to 12 hours.
  3. Back-lit LCD shows timer countdown.

## **2.05 DIMMER SWITCHES**

- A. General:
1. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
  2. Provide protected memory during temporary power failures that restores lights to same level of intensity set prior to power interruption.
  3. Provide dimmer switches UL listed for the type of load being served (LED).
  4. Provide dimmers that provide no adverse effects on other components of the electrical system being served (low voltage transformers, drivers, LEDs, etc.).

## **2.06 WALL PLATES**

- A. Manufacturers:
1. Provide wall plates and corresponding wiring devices from same manufacturer.
- B. Single and combination types to match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: 0.035-inch- thick, satin-finished stainless steel.
  3. Material for Unfinished Spaces: Galvanized steel.
  4. Material for Wet Locations: Gasketed Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- a. Manufacturers:
- 1) Red Dot Model CKSGV (cast aluminum), Thomas & Betts.

## **2.07 FLOOR SERVICE FITTINGS**

- A. Manufacturers:
1. Wiremold.
- B. Type: Modular, fully adjustable recessed-type, with services indicated suitable for wiring method used.
- C. Compartments: Provide barrier separating power from telecommunications cabling. Provide recessed-type floor service fittings with independent compartments and feed through wiring capability.
- D. Service Plate: Provide service plate type as indicated. Provide protective ring for flush service plates.

- E. Power Receptacle(s): NEMA WD 6, Configuration 5-20R Heavy-duty grade duplex receptacle, black finish, unless otherwise indicated.
- F. Telecommunications Outlet: Blank cover with bushed cable opening.

## **2.08 FINISHES**

- A. Color:
  - 1. Wiring Devices Connected to Normal Power System: Brown, unless otherwise indicated or required by NFPA 70.
  - 2. Wiring Devices Connected to Emergency Power System: Red.
  - 3. Wall Switches: Brown, unless otherwise indicated.
  - 4. Dimmer Switches: Brown, unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Prior to installation of devices, verify wall openings are neatly cut and will be completely covered by wall plates, clean debris from outlet boxes and provide extension rings to bring outlet boxes flush with finished surface.
- C. Install devices and assemblies level, plumb, and square with building lines.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging according to manufacturer's written instructions.
- E. Arrangement of Devices:
  - 1. Coordinate locations of outlet boxes provided under Division 26 Section "Raceways and Boxes" to obtain mounting heights indicated on Drawings.
  - 2. Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top.
  - 3. Where multiple switches, dimmers, and/or occupancy sensors are adjacent to each other, provide a single cover plate. Custom fabricate, if required, for all combinations. Provide separate boxes or barriers as required for the application.
  - 4. Install horizontally mounted receptacles with grounding pole on the left.
  - 5. Install GFCI receptacles so that the "Push To Test" and "Reset" designations can be read correctly. If printed in both directions, install with ground pole on top.
  - 6. Install switches with OFF position down.
- F. Install cover plates on switch, receptacle, and blank outlets in finished areas.
- G. Use oversized plates for outlets installed in masonry walls.
- H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- I. Remove wall plates and protect devices and assemblies during painting.
- J. Coordinate installation of access floor boxes with access floor system provided by Architectural trades.
- K. Install properly oriented access floor boxes into cutouts in access floor tiles and secure to tiles per Manufacturer's instructions.
- L. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- M. Adjust devices and wall plates to be flush and level. Three corners of wall plates must be in contact with wall surfaces. Devices shall be solidly mounted against the box.

### **3.02 IDENTIFICATION**

- A. Comply with Division 26 Section "Electrical Identification."
  - 1. Receptacles: Identify panelboard and circuit number from which served. Use adhesive label as specified in Division 26 Section "Electrical Identification" with black-filled lettering on back side of wall plate, and durable wire markers or tags inside outlet boxes.

### **3.03 CONNECTIONS**

- A. Ground equipment according to Division 26 Section "Grounding and Bonding." Connect wiring device grounding terminal to outlet box with bonding jumper. Use of quick ground strap or screw is not acceptable.
- B. Connect wiring according to Division 26 Section "Conductors and Cables." Connect wiring devices by wrapping conductor around screw terminal or by using back wiring and tightening the screw securely.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### **3.04 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Inspect each wiring device for defects.
  - 2. Operate each wall switch with circuit energized and verify proper operation.
  - 3. After installing wiring devices and after electrical circuitry has been energized, test each receptacle for proper polarity, ground continuity, and compliance with requirements.
  - 4. Test each GFCI receptacle for proper operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

### **END OF SECTION**

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TMP13158E, 13174I  
PBA2022.0252.00

## SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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### PART 1 GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
  - 1. Nonfusible switches.
  - 2. Molded-case circuit breakers.
- B. Related Sections:
  - 1. Division 26 "Hangers and Supports for Electrical Systems" for concrete bases.

#### 1.03 DEFINITIONS

- A. GD: General duty.
- B. GFCI: Ground-fault circuit interrupter.
- C. HD: Heavy duty.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

#### 1.04 REFERENCES

- A. NECA 1: Practices for Good Workmanship in Electrical Contracting.
- B. NETA ATS: Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. NEMA AB 1: Molded Case Circuit Breakers and Molded Case Switches.
- E. NEMA FU 1: Low Voltage Cartridge Fuses.
- F. NEMA KS 1: Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- G. NEMA PB1.1: General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
- H. NEMA PB2.1: General Instructions for Proper Installation, Operation, and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
- I. NFPA 70: National Electrical Code.

### **1.05 SUBMITTALS**

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current rating.
  - 4. UL listing for series rating of installed devices.
  - 5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Qualification Data: For testing agency.
- D. Field quality-control test reports including the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Procedures," include the following:
  - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
  - 2. Time-current curves, including selectable ranges for each type of circuit breaker.

### **1.06 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- 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.
- C. Comply with NFPA 70.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

### **1.07 PROJECT CONDITIONS**

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
  - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - 2. Altitude: Not exceeding 6600 feet.

### **1.08 COORDINATION**

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### **2.02 TOGGLE DISCONNECT SWITCH**

- A. Manufacturers:
1. Double Pole:
    - a. Hubbell 1372.
    - b. Leviton 6808G-DAC.
    - c. Pass & Seymour 7812.
    - d. Bryant 30102.
  2. Three Pole:
    - a. Hubbell 1379.
    - b. Leviton 7810GD.
    - c. Pass & Seymour 7813.
    - d. Bryant 30103.
- B. Description: Heavy duty, 30A, 600 volt, double or three pole as required, single throw, motor rated switch without overload protection. Provide NEMA 1 enclosure and padlock attachment.

### **2.03 MOLDED-CASE CIRCUIT BREAKERS**

- A. Manufacturers:
1. Eaton Corporation; Cutler-Hammer Products.
  2. General Electric Co.; Electrical Distribution & Control Division.
  3. Siemens Industries, Inc.
  4. Square D/Group Schneider.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  2. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
  3. GFCI Circuit Breakers: Single- and two-pole configurations with 5 or 30-mA trip sensitivity as required.
- C. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
1. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
  2. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
  3. Enclosure: Provide handle capable of being locked in the open position with padlock.
  4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

### **2.04 ENCLOSURES**

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
1. Indoor Dry Locations: NEMA 250, Type 1.
  2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.
- C. Install switches with off position down.
- D. Install NEMA KS 1 enclosed switch where indicated for motor loads  $\frac{1}{2}$  HP and larger and equipment loads greater than 30A.
- E. Install toggle disconnect switch, surface mounted, where indicated for motor loads less than  $\frac{1}{2}$  HP and equipment loads 30A. and less.
- F. Install fuses in fusible disconnect switches.
- G. Install flexible liquid tight conduit from toggle disconnect switch to portable equipment. Leave a 6'-0" whip.
- H. Install flexible liquid tight conduit from toggle disconnect switch to stationary equipment.
- I. Install control wiring from early break contacts in motor disconnect switch to variable frequency controllers to shut down controller when switch is open.
- J. Install equipment on exterior foundation walls at least one inch from wall to permit vertical flow of air behind breaker and switch enclosures.
- K. Support enclosures independent of connecting conduit or raceway system.
- L. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

### **3.03 IDENTIFICATION**

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Electrical Identification."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 26 Section "Electrical Identification."
- C. Provide adhesive label as specified in Division 26 Section "Electrical Identification" on inside door of each switch indicating UL fuse class and size for replacement.

### **3.04 FIELD QUALITY CONTROL**

- A. Prepare for acceptance testing as follows:
  - 1. Inspect mechanical and electrical connections.
  - 2. Verify switch and relay type and labeling verification.
  - 3. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

### **3.05 CLEANING**

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.

### **END OF SECTION**