# INDIGENOUS DESIGN STUDIO + ARCHITECTURE, LLC



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PROJECT MANUAL - VOLUME 1 JULY 15, 2022 CONSTRUCTION DOCUMENTS	THE OF NEW METTICS STERED ARCHITC
	SEAL / CERTIFICATION
CHURCH ROCK PHASE II FACTORY CHURCH ROCK, NEW MEXICO	
	SEQUENCE1 OF2
	SET NUMBER

### **CHURCH ROCK PHASE II FACTORY**

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262913.03	MANUAL AND MAGNETIC MOTOR CONTROLLERS
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262726	WIRING DEVICES
262416	PANELBOARDS
262200	SWITCHBOARDS
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- 331000 WATER UTILITIES
- 331500 GENERAL REQUIREMENTS FOR STEEL PIPING
- 331613 STORAGE TANK
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- 334000 STORM DRAIN UTILITIES
- 335219 DOMESTIC AND FIRE PUMP SYSTEM

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### DOCUMENT 000101 - PROJECT TITLE PAGE

- 1.1 PROJECT MANUAL VOLUME 1
  - A. Church Rock Phase II Factory .
  - B. Navajo Naton Division of Economic Development .
  - C. Church Rock, New Mexico .
  - D. Architect Project No. 2020.017.
  - E. Indigenous Design Studio + Architecture .
  - F. 8008 Pennsylvania Cir. NE .
  - G. Albuquerque, New Mexico 87110.
  - H. Phone: 505.226.2565 .
  - I. Fax: 505.226.2566 .
  - J. Website: http://www.ids-a.com .
  - K. Issued: <Insert date>.
  - L. Copyright 2022 Indigenous Design Studio + Architecture . All rights reserved.

END OF DOCUMENT 000101

**PROJECT TITLE PAGE** 

### DOCUMENT 000107 - SEALS PAGE

- 1.1 DESIGN PROFESSIONALS OF RECORD
  - A. Architect: Tamarah Begay .
    - 1. License Number: 5192.
  - B. Civil Engineer: Bohannan Huston .
    - 1. License Number: < Insert number>.
  - C. Structural Engineer: Chavez Grieves Consulting Engineers .
    - 1. License Number: < Insert number>.
  - D. Plumbing Engineer: Bridgers & Paxton .
    - 1. License Number: < Insert number>.
  - E. HVAC Engineer: Bridgers & Paxton .
    - 1. License Number: <Insert number>.
  - F. Electrical Engineer: Bridgers & Paxton .
    - 1. License Number: <Insert number>.



### DOCUMENT 000115 - LIST OF DRAWING SHEETS

- 1.1 LIST OF DRAWINGS
  - A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled Construction Documents, dated July 15, 2022, as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 000115

#### LIST OF DRAWING SHEETS 000115 - 1

### DOCUMENT 001113 - ADVERTISEMENT FOR BIDS

### 1.1 PROJECT INFORMATION

- A. Notice to Bidders: Prequalified bidders may submit bids for project as described in this Document. Submit bids according to the Instructions to Bidders.
- B. Project Identification: Church Rock Phase II Factory.
  - 1. Project Location: Church Rock, New Mexico.
- C. Owner: Navajo Nation.
  - 1. Sharlene Begay-Platero.
- D. Architect: Indigenous Design Studio + Architecture LLC.
- E. Construction Manager: Navajo Engineering and Construction Authority .
- F. Project Description: Project consists of 1-story new construction manufacturing and warehouse facility .
- G. Construction Contract: Bids will be received for the following Work:
  - 1. General Contract (all trades).

### 1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
  - 1. Bid Date: TBD .
  - 2. Bid Time: 4:00 PM , local time.
  - 3. Location: <Insert bid receipt's location and room name> , <Insert street address> , <Insert city, state, and zip code>.
- B. Bids will be thereafter publicly opened and read aloud.

### 1.3 BID SECURITY

A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 60 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

#### 1.4 PREBID MEETING

A. Prebid Meeting: See Document 002513 "Prebid Meetings."

#### 1.5 DOCUMENTS

- A. Printed Procurement and Contracting Documents: Obtain after <**Insert date**>, by contacting <**Insert Owner, Architect, or reprographic house address**>. Documents will be provided to prime bidders only; only complete sets of documents will be issued.
  - 1. Deposit: [\$100.00] <Insert amount> [made payable to the Owner].
  - 2. Shipping: Additional shipping charges of **<Insert amount>** will apply.
- B. Online Procurement and Contracting Documents: Obtain access after <Insert date>, by contacting <Insert Owner, Architect, or reprographic house address>. Online access will be provided to [prime bidders only] [all registered bidders and suppliers].
- C. Viewing Procurement and Contracting Documents: Examine after <**Insert date**>, at the locations below:
  - 1. <Insert locations, such as Owner's and Architect's offices and plan rooms>.
- 1.6 TIME OF COMPLETION
  - A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time.
- 1.7 BIDDER'S QUALIFICATIONS
  - A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

#### 1.8 NOTIFICATION

A. This Advertisement for Bids document is issued by the Navajo Nation .

### DOCUMENT 002113 - INSTRUCTIONS TO BIDDERS

#### 1.1 INSTRUCTIONS TO BIDDERS

- A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements by reference.
  - 1. A copy of AIA Document A701, "Instructions to Bidders," is bound in this Project Manual.

END OF DOCUMENT 002113

### INSTRUCTIONS TO BIDDERS 002113 - 1

### DOCUMENT 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

#### 1.1 INSTRUCTIONS TO BIDDERS

- A. Instructions to Bidders for Project consist of the following:
  - 1. AIA Document A701, "Instructions to Bidders [."]
  - 2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

#### 1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

- A. The following supplements modify AIA Document A701, "Instructions to Bidders." Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, unaltered portions of the Instructions to Bidders shall remain in effect.
- 1.3 ARTICLE 2 BIDDER'S REPRESENTATIONS
  - A. Add Section 2.1.3.1:
    - 1. 2.1.3.1 The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.
  - B. Add Section 2.1.5:
    - 1. 2.1.5 The Bidder is a properly licensed Contractor according to the laws and regulations of The Navajo Nation and meets qualifications indicated in the Procurement and Contracting Documents.
  - C. Add Section 2.1.6:
    - 1. 2.1.6 The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.
- 1.4 ARTICLE 3 BIDDING DOCUMENTS
  - A. 3.4 Addenda:
    - 1. 3.4.3 Addenda may be issued seven (7) days prior to the receipt of bids.

### 1.5 ARTICLE 4 - BIDDING PROCEDURES

- A. 4.1 Preparation of Bids:
  - 1. Add Section 4.1.1.1:
    - a. 4.1.1.1 Printable electronic Bid Forms and related documents are available from Architect .
  - 2. Add Section 4.1.8:
    - a. 4.1.8 The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.
  - 3. Add Section 4.1.9:
    - a. 4.1.9 Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.
  - 4. Add Section 4.1.10:
    - a. 4.1.10 Bids shall include sales and use taxes. Contractors shall show separately with each monthly payment application the sales and use taxes paid by them and their subcontractors in the form indicated. Reimbursement of sales and use taxes, if any, shall be applied for by Owner for the sole benefit of Owner.
- B. 4.3 Submission of Bids:
  - 1. Add Section 4.3.1.2:
    - a. 4.3.1.2 Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.
- C. 4.4 Modification or Withdrawal of Bids:
  - 1. Add the following sections to 4.4.2:
    - a. 4.4.2.1 Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.
    - b. 4.4.2.2 Owner will consider modifications to a bid written on the sealed bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS 002213 - 2

- D. 4.5 Break-Out Pricing Bid Supplement:
  - 1. Add Section 4.5:
    - a. 4.5 Provide detailed cost breakdowns no later than two business days following Architect's request.
- E. 4.6 Subcontractors, Suppliers, and Manufacturers List Bid Supplement:
  - 1. Add Section 4.6:
    - a. 4.6 Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products no later than two business days following Architect's request. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Architect.
- 1.6 ARTICLE 5 CONSIDERATION OF BIDS
  - A. 5.2 Rejection of Bids:
    - 1. Add Section 5.2.1:
      - a. 5.2.1 Owner reserves the right to reject a bid based on Owner's and Architect's evaluation of qualification information submitted following opening of bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors.

### 1.7 ARTICLE 6 - POSTBID INFORMATION

- A. 6.1 Contractor's Qualification Statement:
  - 1. Add Section 6.1.1:
    - a. 6.1.1 Submit Contractor's Qualification Statement no later than two business days following Architect's request.

### 1.8 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

- A. 7.1 Bond Requirements:
  - 1. Add Section 7.1.1.1:

#### SUPPLEMENTARY INSTRUCTIONS TO BIDDERS 002213 - 3

- a. 7.1.1.1 Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.
- B. 7.2 Time of Delivery and Form of Bonds:
  - 1. Delete the first sentence of Section 7.2.1 and insert the following:
    - a. The Bidder shall deliver the required bonds to Owner no later than 10 days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.
  - 2. Delete Section 7.2.3 and insert the following:
    - a. 7.2.3 Bonds shall be executed and be in force on the date of the execution of the Contract.

#### 1.9 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

- A. AIA Document A101-2017 Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum .
- 1.10 ARTICLE 9 EXECUTION OF THE CONTRACT
  - A. Add Article 9:
    - 1. 9.1.1 Subsequent to the Notice of Intent to Award, and within 10 days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner through Architect, in such number of counterparts as Owner may require.
    - 2. 9.1.2 Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed.
    - 3. 9.1.3 Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement.
    - 4. 9.1.4 In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

### DOCUMENT 002513 - PREBID MEETINGS

### 1.1 PREBID MEETING

- A. Construction Manager will conduct a Prebid meeting as indicated below:
  - 1. Meeting Date: TBD .
  - 2. Meeting Time: 2:00 p.m. <Insert time>, local time.
  - 3. Location: TBD , <Insert street address> , <Insert city, state, and zip code>.

### B. Attendance:

- 1. Prime Bidders: Attendance at Prebid meeting is recommended .
- 2. Subcontractors: Attendance at Prebid meeting is recommended.
- 3. Notice: Bids will only be accepted from prime bidders represented on Prebid Meeting sign-in sheet.
- C. Bidder Questions: Submit written questions to be addressed at Prebid meeting minimum of two business days prior to meeting.
- D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:
  - 1. Procurement and Contracting Requirements:
    - a. Advertisement for Bids.
    - b. Instructions to Bidders.
    - c. Bidder Qualifications.
    - d. Bonding.
    - e. Insurance.
    - f. Bid Security.
    - g. Bid Form and Attachments.
    - h. Bid Submittal Requirements.
    - i. Bid Submittal Checklist.
    - j. Notice of Award.
  - 2. Communication during Bidding Period:
    - a. Obtaining documents.
    - b. Bidder's Requests for Information.
    - c. Bidder's Substitution Request/Prior Approval Request.
    - d. Addenda.
  - 3. Contracting Requirements:
    - a. Agreement.
    - b. The General Conditions.
    - c. The Supplementary Conditions.
    - d. Other Owner requirements.
  - 4. Construction Documents:
    - a. Scopes of Work.
    - b. Temporary Facilities.
    - c. Use of Site.
    - d. Work Restrictions.

#### PREBID MEETINGS 002513 - 1

- e. Alternates, Allowances, and Unit Prices.
- f. Substitutions following award.
- 5. Separate Contracts:
  - a. Work by Owner.
  - b. Work of Other Contracts.
- 6. Schedule:
  - a. Project Schedule.
  - b. Contract Time.
  - c. Liquidated Damages.
  - d. Other Bidder Questions.
- 7. Site/facility visit or walkthrough.
- 8. Post-Meeting Addendum.
- E. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.
  - 1. Sign-in Sheet: Minutes will include list of meeting attendees.
  - 2. List of Planholders: Minutes will include list of planholders.

END OF DOCUMENT 002513

PREBID MEETINGS 002513 - 2

### DOCUMENT 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

#### 1.1 DEFINITIONS

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

#### 1.2 QUALITY ASSURANCE

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

#### 1.3 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
  - 1. Extensive revisions to the Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
  - 3. The request is fully documented and properly submitted.

### 1.4 SUBMITTALS

- A. Procurement Substitution Request: Submit to Architect . Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:
  - 1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
  - 2. Submittal Format: Submit Procurement Substitution Request, by email to Project Architect.

### PROCUREMENT SUBSTITUTION PROCEDURES

- a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
- b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
  - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
  - 2) Copies of current, independent third-party test data of salient product or system characteristics.
  - 3) Samples where applicable or when requested by Architect.
  - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES or applicable agency
  - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
- c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
- d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.
- B. Architect's Action:
  - 1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.
- C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

### DOCUMENT 003119 - EXISTING CONDITION INFORMATION

#### 1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Survey information that includes information on existing conditions, prepared by Terrametrics, dated <Insert date of survey>, is available for viewing [at the office of Architect].
- C. Related Requirements:
  - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

### DOCUMENT 003132 - GEOTECHNICAL DATA

#### 1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by GEOMAT, dated April 7, 2021, is available for viewing at the office of Architect at the office of Owner.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
  - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:
  - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.

### DOCUMENT 003143 - PERMIT APPLICATION

- 1.1 PERMIT APPLICATION INFORMATION
  - A. Permit: Applied for by Construction Manager.

END OF DOCUMENT 003143

#### PERMIT APPLICATION 003143 - 1

DOCUMENT 004123 - BID FORM - CONSTRUCTION MANAGEMENT (SINGLE-PRIME CONTRACT)

#### 1.1 BID INFORMATION

- A. Bidder:
- B. Project Name: Church Rock Phase II Factory.
- C. Project Location: Church Rock, NM, Church Rock, New Mexico, 87311.
- D. Owner: Navajo Nation.
- E. Architect: Indigenous Design Studio + Architecture.
- F. Architect Project Number: 2020.017 .
- G. Construction Manager: < Insert name of Construction Manager>.

#### 1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All-Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Indigenous Design Studio + Architecture and the Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of above-named Project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:
  - 1. \_\_\_\_\_ Dollars
  - 2. The above amount may be modified by amounts indicated by the Bidder on the attached Bid Supplement Alternates and Bid Supplement Unit Prices.

### 1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within [10] <Insert number> days after a written Notice of Award, if offered within [60] <Insert number> days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1.		Dollars
	(\$).	

BID FORM - CONSTRUCTION MANAGEMENT (SINGLE-PRIME CONTRACT) 004123 - 1

B. In the event Owner does not offer a Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

#### 1.4 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. Concrete		Work:
2. Masonry	·	
Work:		•
3. Roofing		Work:
. Plumbing	<sup>.</sup>	Work:
. HVAC		Work:
Electrical		Work:

#### 1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within **<Insert number>** calendar days.

#### 1.6 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
  - 1. Addendum No. 1, dated \_\_\_\_\_\_.
  - 2. Addendum No. 2, dated \_\_\_\_\_\_.
  - 3. Addendum No. 3, dated \_\_\_\_\_\_.
  - 4. Addendum No. 4, dated \_\_\_\_\_\_.

#### 1.7 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto:
  - 1. Bid Form Supplement Unit Prices.
  - 2. Bid Form Supplement Allowances.
  - 3. Bid Form Supplement Bid Bond Form (AIA Document A310-2010).
  - 4. <Insert name of Bid Form supplement>.

BID FORM - CONSTRUCTION MANAGEMENT (SINGLE-PRIME CONTRACT) 004123 - 2

### 1.8 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in McKinley County / Navajo Nation , and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

### 1.9 SUBMISSION OF BID

А.	Respectfully subr	nitted this	_ day of	, 20	)22 .				
B.	Submitted By: corporation).				(Name	of	biddin	g fir	m or
C.	Authorized signature).	Signature:					(H	andw	/ritten
D.	Signed By: name).						(Туре	or	print
E.	Title: President).			(Owner/Pa	artner/P	resi	dent/V	ice	
F.	Witnessed signature).	Ву:					(H	andw	/ritten
G.	Attest: signature).					(Ha	ndwritt	en	
H.	By: name).					_(T	уре	or	print
I.	Title: Secretary).			(Corporate	Secret	ary	or	Ass	istant
J.	Street Address:								
K.	City, Zip:							:	State,
L.	Phone:								
M.	License No.:								
N.	Federal ID No.: <u>-</u> Here).				(A	ffix	Corpo	orate	Seal

END OF DOCUMENT 004123

#### BID FORM - CONSTRUCTION MANAGEMENT (SINGLE-PRIME CONTRACT) 004123 - 3

### DOCUMENT 004313 - BID SECURITY FORMS

- 1.1 BID FORM SUPPLEMENT
  - A. A completed bid bond form is required to be attached to the Bid Form.
- 1.2 BID BOND FORM
  - A. AIA Document A312-2010 "Bid Bond" is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement.
  - B. Copies of AIA standard forms may be obtained from The American Institute of Architects; <u>https://www.aiacontracts.org/;</u> email: <u>docspurchases@aia.org;</u> (800) 942-7732.

END OF DOCUMENT 004313

**BID SECURITY FORMS** 

### DOCUMENT 004321 - ALLOWANCE FORM

### 1.1 BID INFORMATION

- A. Bidder:
- B. Project Name: Church Rock Phase II Factory.
- C. Project Location: Church Rock, New Mexico.
- D. Owner: Navajo Nation.
- E. Architect: Indigenous Design Studio + Architecture LLC.
- F. Architect Project Number: 2020.017 .
- G. Construction Manager: Navajo Engineering and Construction Authority .
- 1.2 BID FORM SUPPLEMENT
  - A. This form is required to be attached to the Bid Form.
  - B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

### 1.3 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this \_\_\_\_ day of \_\_\_\_\_, 2022 .
- B. Submitted By:\_\_\_\_\_(Insert name of bidding firm or corporation).
- C. Authorized Signature: \_\_\_\_\_(Handwritten signature).
- D. Signed By:\_\_\_\_\_(Type or print name).
- E. Title: \_\_\_\_\_(Owner/Partner/President/Vice President).

### DOCUMENT 004322 - UNIT PRICES FORM

- 1.1 BID INFORMATION
  - A. Bidder:
  - B. Prime Contract: <Insert prime contract name>.
  - C. Project Name: Church Rock Phase II Factory.
  - D. Project Location: Church Rock, NM, Church Rock, New Mexico, 87311, United States.
  - E. Owner: Navajo Nation.
  - F. Owner Project Number: <Insert Owner Project number>.
  - G. Architect: Indigenous Design Studio + Architecture.
  - H. Architect Project Number: 2020.017 .
  - I. Construction Manager: Navajo Engineering and Construction Authority .
- 1.2 BID FORM SUPPLEMENT
  - A. This form is required to be attached to the Bid Form.
  - B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work [and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work].
  - C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

#### 1.3 UNIT PRICES

- A. Unit-Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.
  - 1. \_\_\_\_\_ dollars (\$\_\_\_\_\_) per \_\_\_\_\_
- B. Unit-Price No. 2: Rock excavation and replacement with satisfactory soil material.
  - 1. \_\_\_\_\_ dollars (\$\_\_\_\_\_) per \_\_\_\_\_
- C. Unit-Price No. 3: Cutting and patching of concrete floor slabs.

#### UNIT PRICES FORM 004322 - 1

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### Church Rock Phase II Factory | Church Rock, NM

	1unit.	_ dollars (\$) per
D.	Unit-Price No. 4: Miscellaneous and structural steel.	
	1unit.	_ dollars (\$) per
E.	Unit-Price No. <insert number="" unit-price=""> : <insert td="" u<=""><td>init-price item&gt;.</td></insert></insert>	init-price item>.
	1 unit.	_ dollars (\$) per
1.4	SUBMISSION OF BID SUPPLEMENT	
A.	Respectfully submitted this day of	_, 2022 .
В.	Submitted By: or corporation).	(Insert name of bidding firm
C.	Authorized Signature:signature).	(Handwritten
D.	Signed By: name).	(Type or print
E.	Title:(Own President).	er/Partner/President/Vice

END OF DOCUMENT 004322

UNIT PRICES FORM 004322 - 2

### DOCUMENT 004373 - PROPOSED SCHEDULE OF VALUES FORM

- 1.1 BID FORM SUPPLEMENT
  - A. A completed Proposed Schedule of Values form is required to be attached to the Bid Form.
- 1.2 PROPOSED SCHEDULE OF VALUES FORM
  - A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five **<Insert number>** percent of the Contract Sum.
  - B. Arrange schedule of values using AIA Document G703-1992 < Insert name and designation of standard form>.
    - 1. Copies of AIA standard forms may be obtained from the American Institute of Architects; https://www.aiacontracts.org/ library; (800) 942-7732.

END OF DOCUMENT 004373

### DOCUMENT 004393 - BID SUBMITTAL CHECKLIST

### 1.1 BID INFORMATION

- A. Bidder:
- B. Prime Contract:
- C. Project Name: Church Rock Phase II Factory.
- D. Project Location: Church Rock, New Mexico.
- E. Owner: Navajo Nation.
- F. Architect: Indigenous Design Studio + Architecture LLC.
- G. Architect Project Number: 2020.020.
- H. Construction Manager: Navajo Engineering and Construction Authority .

### 1.2 BIDDER'S CHECKLIST

- A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.
- B. Attach this completed checklist to the outside of the Submittal envelope.
  - 1. Used the Bid Form provided in the Project Manual.
  - 2. Prepared the Bid Form as required by the Instructions to Bidders.
  - 3. Indicated on the Bid Form the Addenda received.
  - 4. Attached to the Bid Form: Bid Supplement Form Allowances.
  - 5. Attached to the Bid Form: Bid Supplement Form Unit Prices.
  - 6. Attached to the Bid Form: Bid Supplement Form Alternates.
  - 7. Attached to the Bid Form: Proposed Schedule of Values Form.
  - 8. Attached to the Bid Form: AIA Document A310-2010 .
  - 9. Attached to the Bid Form: Bid Bond OR a certified check for the amount required.
  - 10. Bid envelope shows name and address of the Bidder.
  - 11. Bid envelope shows the Bidder's Contractor's License Number.
  - 12. Bid envelope shows name of Project being bid.
  - 13. Bid envelope shows name of Prime Contract being bid, if applicable.
  - 14. Bid envelope shows time and day of Bid Opening.
  - 15. Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.
  - 16. Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

END OF DOCUMENT 004393

## BID SUBMITTAL CHECKLIST

### DOCUMENT 005100 - NOTICE OF AWARD

### 1.1 BID INFORMATION

- A. Bidder: <Insert successful bidder name>.
- B. Bidder's Address: < Insert street address, city, state, zip, and telephone>.
- C. Project Name: Church Rock Phase II Factory.
- D. Project Location: Church Rock, New Mexico.
- E. Owner: Navajo Nation.
- F. Architect: Indigenous Design Studio + Architecture LLC.
- G. Architect Project Number: 2020.020.

### 1.2 NOTICE OF [**INTENT TO AWARD**] CONTRACT

- A. Notice: The above Bidder is hereby notified that their bid, dated <**Insert date**>, for the above Contract has been considered and the Bidder is hereby awarded a contract for <**Insert brief description of Work or sections of Work awarded**>.
- B. Contract Sum: The Contract Sum is <**Insert written amount**> dollars (\$<**Insert numeric amount**>).

### 1.3 EXECUTION OF CONTRACT

- A. Contract Documents: Copies of the Contract Documents will be made available to the Bidder immediately. The Bidder must comply with the following conditions precedent within [10] <Insert number> days of the above date of issuance of the Notice:
  - 1. Deliver to Owner [three] <Insert number> sets of fully executed copies of the Contract Documents.
  - 2. Deliver with the executed Contract Documents Bonds and Certificates of Insurance required by the Contract Documents.
  - 3. <Insert conditions precedent>.
- B. Compliance: Failure to comply with conditions of this Notice within the time specified will entitle Owner to consider the Bidder in default, annul this Notice, and declare the Bidder's Bid security forfeited.
  - 1. Within **[10]** <**Insert number**> days after the Bidder complies with the conditions of this Notice, Owner will return to the Bidder one fully executed copy of the Contract Documents.

### 1.4 NOTIFICATION

A. This Notice is issued by:

1.	Owner:	
2.	Authorized Signature:	(Handwritten
	signature).	
3.	Signed By:	(Type or

print name).
4. Title: \_\_\_\_\_\_(Owner/Partner/President/Vice President).

END OF DOCUMENT 005100

### NOTICE OF AWARD 005100 - 2
# SECTION 006000 - PROJECT FORMS

### 1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
  - 1. AIA Document A133-2009 "Standard Form of Agreement between Owner and Construction Manager as Constructor Where the Basis of Payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price."
    - a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."
  - 2. The General Conditions are included in the Project Manual .
  - 3. The Supplementary Conditions for Project are separately prepared and included in the Project Manual.
  - 4. Owner's document(s) bound following this Document.

### 1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; https://www.aiacontractdocs.org; (800) 942-7732.
- C. Preconstruction Forms:
  - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312-2010 "Performance Bond and Payment Bond."
  - 2. Form of Certificate of Insurance: AIA Document G715-1991 "Supplemental Attachment, ACORD Certificate of Insurance."
- D. Information and Modification Forms:
  - 1. Form for Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
  - 2. Form of Request for Proposal: AIA Document G709-2001 "Work Changes Proposal Request."
  - 3. Change Order Form: AIA Document G701-2001 "Change Order."
  - 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-1992 "Architect's Supplemental Instructions."
  - 5. Form of Change Directive: AIA Document G714-2007 "Construction Change Directive."
- E. Payment Forms:
  - 1. Schedule of Values Form: AIA Document G703-1992 "Continuation Sheet."

# PROJECT FORMS 006000 - 1

- 2. Payment Application: AIA Document G702-1992/703-1992 "Application and Certificate for Payment and Continuation Sheet."
- 3. Form of Contractor's Affidavit: AIA Document G706-1994 "Contractor's Affidavit of Payment of Debts and Claims."
- 4. Form of Affidavit of Release of Liens: AIA Document G706A-1994 "Contractor's Affidavit of Payment of Release of Liens."
- 5. Form of Consent of Surety: AIA Document G707-1994 "Consent of Surety to Final Payment."

END OF DOCUMENT 006000

**PROJECT FORMS** 

# SECTION 009113 - ADDENDA

# 1.1 PROJECT INFORMATION

- A. Project Name: Church Rock Phase II Factory.
- B. Owner: Navajo Nation.
- C. Architect: Indigenous Design Studio + Architecture LLC.
- D. Architect Project Number: 2020.020.
- E. Date of Addendum: < Insert date of Addendum>.

# 1.2 NOTICE TO BIDDERS

- A. This Addendum is issued **[to all registered plan holders]** pursuant to the **[Instructions to Bidders] [and] [Conditions of the Contract]**. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form.
- C. The date for receipt of bids is changed to the following, at same time and location.
  - 1. Bid Date: <Insert date>.

# 1.3 ATTACHMENTS

- A. This Addendum includes no attachments.
- B. This Addendum includes the following attached Documents and Specification Sections:
  - 1. Document <Insert Document number and name> , dated <Insert date> , [(reissued)] [(new)].
  - Section <Insert Section number and name> , dated <Insert date> , [(reissued)] [(new)].
- C. This Addendum includes the following attached Sheets:
  - 1. General Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
  - 2. Civil Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
  - 3. Landscape Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
  - 4. Structural Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].

- 5. Architectural Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- 6. Interiors Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- 7. Fire Protection Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- 8. Plumbing Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- 9. Mechanical Sheet <Insert number>, dated <Insert date>, [(reissued)] [(new)].
- 10. Electrical Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- 11. Telecommunications Sheet <Insert number> , dated <Insert date> , [(reissued)] [(new)].
- D. This Addendum includes the attached Addendum Drawings:
  - 1. Civil Addendum Drawing CAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 2. Landscape Addendum Drawing LAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 3. Structural Addendum Drawing SAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 4. Architectural Addendum Drawing AAD-<**Insert number**> , dated <**Insert date**>, revising Sheet <**Insert number**>.
  - 5. Fire Protection Addendum Drawing FAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 6. Plumbing Addendum Drawing PAD-<**Insert number**> , dated <**Insert date**>, revising Sheet <**Insert number**>.
  - 7. Mechanical Addendum Drawing MAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 8. Electrical Addendum Drawing EAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.
  - 9. Telecommunications Addendum Drawing TAD-<Insert number> , dated <Insert date>, revising Sheet <Insert number>.

# 1.4 REVISIONS TO PREVIOUS ADDENDA

- A. Addendum No. 1, Item <Insert number> : Document <Insert Document number and name> , [(not reissued)] [(reissued)] [(new document)].
  - 1. Paragraph <Insert number> : <Insert explanatory text>.
- B. Addendum No. 1, Item <Insert number>: Specification Section <Insert Section number and name>, [(not reissued)] [(reissued)] [(new document)].
  - 1. Paragraph <Insert number> : <Insert explanatory text>.

END OF DOCUMENT 009113

# SECTION 011000 - SUMMARY

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Owner-furnished/Contractor-installed (OFCI) products.
  - 4. Contractor's use of site and premises.
  - 5. Coordination with occupants.
  - 6. Work restrictions.
  - 7. Specification and Drawing conventions.
- B. Related Requirements:
  - 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
- 1.2 PROJECT INFORMATION
  - A. Project Identification: Church Rock Phase II Factory.
    - 1. Project Location: Church Rock, NM, Church Rock, New Mexico.
  - B. Owner: Navajo Nation
  - C. Architect: Indigenous Design Studio + Architecture LLC, 8008 Pennsylvania Circle, Albuquerque, New Mexico, 87110.
  - D. Construction Manager: Navajo Engineering and Construction Authority .
    - 1. Construction Manager for this Project is Project's constructor. The terms "Construction Manager" and "Contractor" are synonymous.

# 1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Type of Contract:
  - 1. Project will be constructed under a single prime contract.

### 1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

### 1.5 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

#### 1.6 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two **<Insert number>** days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Project site is not permitted.
- D. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- E. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
  - 1. Maintain list of approved screened personnel with Owner's representative.

### 1.7 SPECIFICATION AND DRAWING CONVENTIONS

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

# SUMMARY 011000 - 2

- 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
- 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

# SECTION 012100 - ALLOWANCES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
  - 2. Unit-cost allowances.
  - 3. Quantity allowances.
  - 4. Contingency allowances.
- C. Related Requirements:
  - 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.

### 1.2 SELECTION AND PURCHASE

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

#### 1.3 ACTION SUBMITTALS

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

# 1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

# ALLOWANCES 012100 - 1

### 1.5 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include [taxes, ]freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

### 1.6 UNIT-COST ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include [taxes, ]freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

### 1.7 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include [taxes, ]freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

#### 1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's [**overhead**, **profit**, **and**] related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation [, **taxes**], insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

### 1.9 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
  - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
  - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
  - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.
- PART 2 PRODUCTS (Not Used)

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.
- 3.2 PREPARATION
  - A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

# 3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 7: Contingency Allowance: Include a contingency allowance of \$100,000.00 for use according to Owner's written instructions.

END OF SECTION 012100

ALLOWANCES 012100 - 4

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# SECTION 012200 - UNIT PRICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.

#### 1.2 DEFINITIONS

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

#### 1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, [applicable taxes, ]overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

UNIT PRICES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

- 3.1 SCHEDULE OF UNIT PRICES
  - A. Unit Price No. <Insert unit-price number> <Insert unit-price item>:
    - 1. Description: <Insert unit-price item description> according to Section <Insert Section number> "<Insert Section title>."
    - 2. Unit of Measurement: <Insert unit of measurement>.
    - 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."

END OF SECTION 012200

UNIT PRICES 012200 - 2

# SECTION 012500 - SUBSTITUTION PROCEDURES

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Document 002600 "Procurement Substitution Procedures" for requirements for substitution requests prior to award of Contract.
  - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

### 1.2 DEFINITIONS

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

# 1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided in Project Manual .
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design

# SUBSTITUTION PROCEDURES

characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- e. Samples, where applicable or requested.
- f. Certificates and qualification data, where applicable or requested.
- g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
- h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES IBC 2015.
- j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
- I. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 fifteen days of receipt of request, or seven 7 days of receipt of additional information or documentation, whichever is later.
  - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

# 1.4 QUALITY ASSURANCE

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

# 1.5 PROCEDURES

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

### 1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 fifteen days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after commencement of the Work . Requests received after that time may be considered or rejected at discretion of Architect.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.

#### SUBSTITUTION PROCEDURES 012500 - 3

- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

# SUBSTITUTION PROCEDURES 012500 - 4

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# SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

### 1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.

#### 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 15 days when not otherwise specified after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

#### CONTRACT MODIFICATION PROCEDURES 012600 - 1

- 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
- 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
- 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
- 4. Include costs of labor and supervision directly attributable to the change.
- 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

# 1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

# 1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

# SECTION 012900 - PAYMENT PROCEDURES

# PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

### 1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - Submit the schedule of values to Architect at earliest possible date, but no later than [seven] <Insert number> days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Arrange schedule of values consistent with format of [AIA Document G703] <Insert name and designation of standard form>.
  - 2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of [five] <Insert number> percent of the Contract Sum.
  - 3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site.
  - 4. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
  - 5. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
  - 6. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
  - Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling [five]
    <Insert number> percent of the Contract Sum and subcontract amount.
  - 8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract

#### PAYMENT PROCEDURES 012900 - 1

Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

### 1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month <**Insert specific day of the month**>.
  - 1. Submit draft copy of Application for Payment [seven] < Insert number> days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit three 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
  - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.

- 2. When an application shows completion of an item, submit conditional final or full waivers.
- 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
- 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
- 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Contractor's construction schedule (preliminary if not final).
  - 4. Products list (preliminary if not final).
  - 5. Sustainable design action plans, including preliminary project materials cost data.
  - 6. Schedule of unit prices.
  - 7. Submittal schedule (preliminary if not final).
  - 8. List of Contractor's staff assignments.
  - 9. List of Contractor's principal consultants.
  - 10. Copies of building permits.
  - 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 12. Initial progress report.
  - 13. Report of preconstruction conference.
  - 14. Certificates of insurance and insurance policies.
  - 15. Performance and payment bonds.
  - 16. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 3. Updated final statement, accounting for final changes to the Contract Sum.
  - 4. AIA Document G706.
  - 5. AIA Document G706A.
  - 6. AIA Document G707.
  - 7. Evidence that claims have been settled.

#### PAYMENT PROCEDURES 012900 - 3

- 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
- 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

### PAYMENT PROCEDURES 012900 - 4

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# SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Project meetings.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 2. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

### 1.2 INFORMATIONAL SUBMITTALS

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

# 1.3 GENERAL COORDINATION PROCEDURES

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

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

### 1.4 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
  - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

# PROJECT MANAGEMENT AND COORDINATION

- 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
- 6. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

# 1.5 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  - 1. Owner name.
  - 2. Owner's Project number.
  - 3. Name of Architect.
  - 4. Architect's Project number.
  - 5. Date.
  - 6. Name of Contractor.
  - 7. RFI number, numbered sequentially.
  - 8. RFI subject.
  - 9. Specification Section number and title and related paragraphs, as appropriate.
  - 10. Drawing number and detail references, as appropriate.
  - 11. Field dimensions and conditions, as appropriate.
  - 12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 13. Contractor's signature.
  - 14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven 7 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

# PROJECT MANAGEMENT AND COORDINATION

- 1. The following Contractor-generated RFIs will be returned without action:
  - a. Requests for approval of submittals.
  - b. Requests for approval of substitutions.
  - c. Requests for coordination information already indicated in the Contract Documents.
  - d. Requests for adjustments in the Contract Time or the Contract Sum.
  - e. Requests for interpretation of Architect's actions on submittals.
  - f. Incomplete RFIs or inaccurately prepared RFIs.
- 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
- 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly . Use software log that is part of web-based Project management software. Include the following:
  - 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of Architect.
  - 4. RFI number including RFIs that were returned without action or withdrawn.
  - 5. RFI description.
  - 6. Date the RFI was submitted.
  - 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

# 1.6 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
  - 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
  - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  - 3. Digital Drawing Software Program: Contract Drawings are available in Autodesk Revit 2020 .
  - 4. The following digital data files will be furnished for each appropriate discipline:
    - a. Floor plans.
    - b. Reflected ceiling plans.
    - c. Details sheets as needed .

- B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
  - 1. Web-based Project management software includes, at a minimum, the following features:
    - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - c. Document workflow planning, allowing customization of workflow between project entities.
    - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
    - e. Track status of each Project communication in real time, and log time and date when responses are provided.
    - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    - g. Processing and tracking of payment applications.
    - h. Processing and tracking of contract modifications.
    - i. Creating and distributing meeting minutes.
    - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    - k. Management of construction progress photographs.
    - I. Mobile device compatibility, including smartphones and tablets.

# m. <Insert description of software feature>.

- 2. Provide up to [seven] <Insert number> web-based Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide up to [eight] <Insert number> hours of software training at Architect's office for web-based Project software users.
- 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- 4. Provide [**one of**]the following web-based Project management software packages under their current published licensing agreements:
  - a. Autodesk; Constructware.
  - b. Corecon Technologies, Inc.
  - c. Meridian Systems; Prolog.
  - d. Newforma, Inc.
  - e. Procore Technologies, Inc.
  - f. Viewpoint, Inc.; [Viewpoint Team] [Viewpoint for Projects].
  - g. <Insert name of hosting company and product>.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

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

# 1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than ten days after execution of the Agreement.
  - 1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - I. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Preparation of Record Documents.
    - o. Use of the premises.
    - p. Work restrictions.
    - q. Working hours.
    - r. Owner's occupancy requirements.
    - s. Responsibility for temporary facilities and controls.
    - t. Procedures for moisture and mold control.
    - u. Procedures for disruptions and shutdowns.
    - v. Construction waste management and recycling.
    - w. Parking availability.
    - x. Office, work, and storage areas.
    - y. Equipment deliveries and priorities.
    - z. First aid.

- aa. Security.
- bb. Progress cleaning.
- 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
  - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility requirements.
    - k. Time schedules.
    - I. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at monthly intervals.
  - 1. Coordinate dates of meetings with preparation of payment requests.

- 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
- 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - 1) Review schedule for next period.
  - b. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Resolution of BIM component conflicts.
    - 4) Status of submittals.
    - 5) Deliveries.
    - 6) Off-site fabrication.
    - 7) Access.
    - 8) Site use.
    - 9) Temporary facilities and controls.
    - 10) Progress cleaning.
    - 11) Quality and work standards.
    - 12) Status of correction of deficient items.
    - 13) Field observations.
    - 14) Status of RFIs.
    - 15) Status of Proposal Requests.
    - 16) Pending changes.
    - 17) Status of Change Orders.
    - 18) Pending claims and disputes.
    - 19) Documentation of information for payment requests.
- 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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# SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's Construction Schedule.
  - 2. Construction schedule updating reports.
  - 3. Daily construction reports.
  - 4. Site condition reports.

#### 1.2 DEFINITIONS

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

# 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file.
  - 2. PDF file.
  - 3. One paper copies, of sufficient size to display entire period or schedule, as required.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Daily Construction Reports: Submit at weekly intervals.
- E. Site Condition Reports: Submit at time of discovery of differing conditions.

#### 1.4 COORDINATION

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

# 1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - Use Microsoft Project, Scheduling component of Project management software package specified in Section 013100 "Project Management and Coordination," <Insert name of specific software,> for current Windows operating system.
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

### CONSTRUCTION PROGRESS DOCUMENTATION 013200 - 2

- 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
- Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  a. TBD.
- 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
- 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
- 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- 6. Punch List and Final Completion: Include not more than 20 days for completion of punch list items and final completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  - 1. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  - 2. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b.
    - c. Uninterruptible services.
    - d.
    - e. Use-of-premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  - 3. Other Constraints: TBD .
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and the Contract Time.
- F. Contractor's Construction Schedule Updating: At monthly construction meeting intervals, update schedule to reflect actual construction progress and activities. Issue schedule 5 days before each regularly scheduled progress meeting.

- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
- 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
- 3. As the Work progresses, indicate final completion percentage for each activity.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

# 1.6 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Ganttchart-type, Contractor's Construction Schedule within 14 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

# 1.7 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions, including presence of rain or snow.

#### CONSTRUCTION PROGRESS DOCUMENTATION 013200 - 4
- 7. Testing and inspection.
- 8. Accidents.
- 9. Meetings and significant decisions.
- 10. Stoppages, delays, shortages, and losses.
- 11. Meter readings and similar recordings.
- 12. Emergency procedures.
- 13. Orders and requests of authorities having jurisdiction.
- 14. Change Orders received and implemented.
- 15. Construction or Work Change Directives received and implemented.
- 16. Services connected and disconnected.
- 17. Equipment or system tests and startups.
- 18. Partial completions and occupancies.
- 19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION 013200 - 5

# SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Concealed Work photographs.
  - 3. Periodic construction photographs.
  - 4. Final completion construction photographs.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
  - 2.
  - 3.
  - 4. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

# 1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Submit photos [by uploading to web-based Project management software site] and cloud based file share system as established by project team. Include copy of key plan indicating each photograph's location and direction.
  - 2. Identification: Provide the following information with each image description in file metadata tag :
    - a. Name of Project.
    - b. Name of Contractor.
    - c. Date photograph was taken.
    - d. Description of location, vantage point, and direction.

# 1.3 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 18 megapixels, and at an image resolution of not less than 1800 by 1200 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

# PHOTOGRAPHIC DOCUMENTATION

- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time and GPS location data from camera.
- D. File Names: Name media files with date Project area Project Name and sequential numbering suffix.

#### 1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Take minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 2. Take minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
  - 3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
  - 1. Underground utilities.
  - 2. Underslab services.
  - 3. Piping.
  - 4. Electrical conduit.
  - 5. Waterproofing and weather-resistant barriers.
  - 6. Document footings, foundation, and structural reinforcement prior to concrete pour.
- D. Periodic Construction Photographs: Take minimum of 20 photographs weekly . Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take 50 or more photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

# PHOTOGRAPHIC DOCUMENTATION 013233 - 3

# SECTION 013300 - SUBMITTAL PROCEDURES

# PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 DEFINITIONS

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

#### 1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

#### 1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
  - 1. Project name.
  - 2. Date.
  - 3. Name of Architect.
  - 4. Name of Contractor.
  - 5. Name of firm or entity that prepared submittal.
  - 6. Names of subcontractor, manufacturer, and supplier.
  - 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
  - 8. Category and type of submittal.
  - 9. Submittal purpose and description.

#### SUBMITTAL PROCEDURES 013300 - 1

- 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
- 11. Drawing number and detail references, as appropriate.
- 12. Location(s) where product is to be installed, as appropriate.
- 13. Other necessary identification.
- 14. Remarks.
- 15. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals for Utilizing Web-Based Project Management Software: Prepare submittals as PDF files, or other format indicated by Project management software.

#### 1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
  - 2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
- 2. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

#### 1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Standard color charts.
    - c. Statement of compliance with specified referenced standards.
    - d. Testing by recognized testing agency.
    - e. Application of testing agency labels and seals.
    - f. Notation of coordination requirements.
    - g. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

- a. Identification of products.
- b. Schedules.
- c. Compliance with specified standards.
- d. Notation of coordination requirements.
- e. Notation of dimensions established by field measurement.
- f. Relationship and attachment to adjoining construction clearly indicated.
- g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
  - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
    - f. Specification paragraph number and generic name of each item.
  - 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
  - 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
  - 5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  - 6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  - 7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

# SUBMITTAL PROCEDURES 013300 - 4

- a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
  - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
  - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
- E. Test and Research Reports:
  - 1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
  - 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
  - 3. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

# 1.7 DELEGATED-DESIGN SERVICES

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

#### 1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp . Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
  - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

#### 1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required , and return it.
  - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action . , as follows:
    - a. Architects submittal stamp includes a statement that submittal generally conforms to the design intent and information in construction documents. The architect will mark the submittal approved, rejected, furnish as corrected, revise and resubmit, or submit the specified item. Stamp will be signed and dated by the project architect.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

# SUBMITTAL PROCEDURES 013300 - 7

# SECTION 014000 - QUALITY REQUIREMENTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. 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.

#### 1.2 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 and Inspections: 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 Work result does not require that certain construction activities 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. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
- 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed onsite as freestanding temporary built elements or as indicated in-place portions of permanent construction, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
  - a. Include each system, assembly, component, and part of the exterior wall to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.
- 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- 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. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- 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 and Inspections: 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 have the same meaning 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.

# 1.3 DELEGATED-DESIGN SERVICES

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

B. Delegated-Design Services Statement: 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.

# 1.4 CONFLICTING REQUIREMENTS

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

# 1.5 ACTION SUBMITTALS

# 1.6 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. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
  - 2. 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.

# 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, 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.

# 1.8 QUALITY ASSURANCE

- A. 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

# QUALITY REQUIREMENTS 014000 - 4

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 and Inspecting 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 E329 <Insert standard>; 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. 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.

QUALITY REQUIREMENTS 014000 - 5

- 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.
- J. 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.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  - 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 10. Demolish and remove mockups when directed unless otherwise indicated.

# 1.9 QUALITY CONTROL

- A. 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 <**Insert number**> 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.

#### QUALITY REQUIREMENTS 014000 - 6

- B. 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.
- C. 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 insitu 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.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- E. 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.
- F. Contractor's Associated Requirements and 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.

- G. Coordination: Coordinate sequence of activities to accommodate required qualityassurance 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.

# 1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, 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 qualitycontrol 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

# 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
  - 1. Submit log at Project closeout as part of Project Record Documents.

#### 3.2 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 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

# SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### 1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use [with metering] [without metering and without payment of use charges]. Provide connections and extensions of services [and metering] as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use [with metering] [without metering and without payment of use charges]. Provide connections and extensions of services [and metering] as required for construction operations.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

#### TEMPORARY FACILITIES AND CONTROLS 015000 - 1

- 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
- 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- 3. Indicate methods to be used to avoid trapping water in finished work.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

#### 1.5 PROJECT CONDITIONS

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

# PART 2 - PRODUCTS

#### 2.1 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

#### 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

#### TEMPORARY FACILITIES AND CONTROLS 015000 - 2

- 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
- 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

# PART 3 - EXECUTION

# 3.1 TEMPORARY FACILITIES, GENERAL

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

# 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

# 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to private system indicated as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
  - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service overhead unless otherwise indicated.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one <**Insert number**> land-based telephone line(s) for each field office.
- I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

# 3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
  - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
  - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated and within construction limits indicated on Drawings.
  - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

- 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
- 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- E. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touch up signs so they are legible at all times.
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

#### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

- 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .
- 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- E. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

# 3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.

- 4. Remove standing water from decks.
- 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard and replace stored or installed material that begins to grow mold.
  - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- 3.7 OPERATION, TERMINATION, AND REMOVAL
  - A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
  - B. Maintenance: Maintain facilities in good operating condition until removal.
    - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  - C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
  - D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
    - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
    - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

# SECTION 016000 - PRODUCT REQUIREMENTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

#### 1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

# 1.3 QUALITY ASSURANCE

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

# 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

#### 1.5 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

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

# PART 2 - PRODUCTS

#### 2.1 PRODUCT SELECTION PROCEDURES

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

- a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
- C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

# 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
  - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
  - 1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
  - 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.
- D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

# PRODUCT REQUIREMENTS 016000 - 5

# SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous construction waste.
  - 2. Recycling nonhazardous construction waste.
  - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
  - 1. Section 011200 "Multiple Contract Summary" for coordination of responsibilities for waste management.
  - 2. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
  - 3. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

#### 1.2 DEFINITIONS

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

#### 1.3 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 14 days of date established for the Notice to Proceed .

#### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL 017419 - 1

# 1.4 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.
  - 3. Total quantity of waste in tons.
  - 4. Quantity of waste salvaged, both estimated and actual in tons.
  - 5. Quantity of waste recycled, both estimated and actual in tons.
  - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
  - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

# 1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements.
- B. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

# 1.6 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of demolition siteclearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

# PART 2 - PRODUCTS

# PART 3 - EXECUTION

# 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

#### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL 017419 - 3

- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
  - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Transportation equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

# 3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 024119 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for [Sale] and [Donation] : Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area on-site designated by Owner.
  - 5. Protect items from damage during transport and storage.
- 3.3 RECYCLING [AND] CONSTRUCTION WASTE, GENERAL
  - A. General: Recycle paper and beverage containers used by on-site workers.
  - B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall [accrue to Owner] [accrue to Contractor] be shared equally by Owner and Contractor.
  - C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
  - D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
    - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL 017419 - 4
- a. Inspect containers and bins for contamination and remove contaminated materials if found.
- 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
- 4. Store components off the ground and protect from the weather.
- 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

# 3.4 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
  - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  - 2. Polystyrene Packaging: Separate and bag materials.
  - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
  - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
- D. Paint: Seal containers and store by type.

# 3.5 DISPOSAL OF WASTE

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

- B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.
- C. Burning: Do not burn waste materials.

END OF SECTION 017419

# CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL 017419 - 6

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# SECTION 017700 - CLOSEOUT PROCEDURES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
  - 2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 3. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

#### 1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 14 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect . Label with manufacturer's name and model number.
  - 5. Submit testing, adjusting, and balancing records.
  - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of seven days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  - 6. Advise Owner of changeover in utility services.
  - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 9. Complete final cleaning requirements.
  - 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of seven days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

# 1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
  - 1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
  - 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

#### 1.6 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first, listed by room or space number.
  - 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
      - b. Date.
      - c. Name of Architect.
      - d. Name of Contractor.
      - e. Page number.
  - 4. Submit list of incomplete items in the following format:
    - a. PDF Electronic File: Architect will return annotated file.
    - b. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

#### 1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - 1. Submit on digital media acceptable to Architect .
- D. Warranties in Paper Form:
  - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

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

# PART 3 - EXECUTION

#### 3.1 FINAL CLEANING

- A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.

- b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- d. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
- e. Vacuum and mop concrete.
- f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
- g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
- h. Remove labels that are not permanent.
- i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- I. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
- m. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
- n. Clean strainers.
- o. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste-disposal requirements in [Section 015000 "Temporary Facilities and Controls."] Section 017419 "Construction Waste Management and Disposal."

# 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

# SECTION 017823 - OPERATION AND MAINTENANCE DATA

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit on digital media acceptable to Architect by uploading to web-based project software site. Enable reviewer comments on draft submittals.
  - 2. Submit three paper copies. Architect will return two copies.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 <**Insert number**> days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 <**Insert number**> days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### 1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
  - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
  - 2. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

# 1.4 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.

#### OPERATION AND MAINTENANCE DATA 017823 - 2

- 6. Name and contact information for Architect.
- 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
- 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

# 1.5 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  - 1. Fire.
  - 2. Flood.
  - 3. Gas leak.
  - 4. Water leak.
  - 5. Power failure.
  - 6. Water outage.
  - 7. System, subsystem, or equipment failure.
  - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:

#### OPERATION AND MAINTENANCE DATA 017823 - 3

- 1. Instructions on stopping.
- 2. Shutdown instructions for each type of emergency.
- 3. Operating instructions for conditions outside normal operating limits.
- 4. Required sequences for electric or electronic systems.
- 5. Special operating instructions and procedures.

# 1.6 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
  - 1. Product name and model number. Use designations for products indicated on Contract Documents.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.
  - 8. Engineering data and tests.
  - 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
  - 1. Startup procedures.
  - 2. Equipment or system break-in procedures.
  - 3. Routine and normal operating instructions.
  - 4. Regulation and control procedures.
  - 5. Instructions on stopping.
  - 6. Normal shutdown instructions.

# OPERATION AND MAINTENANCE DATA

#### 017823 - 4

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- 7. Seasonal and weekend operating instructions.
- 8. Required sequences for electric or electronic systems.
- 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

# 1.7 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds, as described below.
- C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.

# OPERATION AND MAINTENANCE DATA

- 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.
- H. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

# 1.8 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

#### OPERATION AND MAINTENANCE DATA 017823 - 6

- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

# SECTION 017839 - PROJECT RECORD DOCUMENTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record specifications.
  - 3. Record Product Data.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit Record Digital Data Files and one set(s) of plots.
      - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit one paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned Record Prints and one set(s) of file prints.
      - 3) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files one paper copies of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories and one paper copies of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

# 1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Details not on the original Contract Drawings.
    - I. Field records for variable and concealed conditions.
    - m. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
  - 1. Format: Annotated PDF electronic file with comment function enabled.
  - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  - 3. Refer instances of uncertainty to Architect for resolution.

#### PROJECT RECORD DOCUMENTS 017839 - 2

- 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Format: Annotated PDF electronic file with comment function enabled.
  - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  - 4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

# 1.4 RECORD SPECIFICATIONS

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

# 1.5 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

#### PROJECT RECORD DOCUMENTS 017839 - 3

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

#### 1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

# SECTION 017900 - DEMONSTRATION AND TRAINING

# PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit one copies within five days of end of each training module.
  - 1. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

#### 1.5 COORDINATION

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

#### 1.6 INSTRUCTION PROGRAM

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

# DEMONSTRATION AND TRAINING

#### 017900 - 2

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

# 1.7 PREPARATION

6.

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

#### DEMONSTRATION AND TRAINING 017900 - 3

#### 1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner , through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

# 1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 18 megapixels and capable of recording in full HD mode with vibration reduction technology.
  - 1. Submit video recordings on CD-ROM or thumb drive .
- B. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
- C. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
- D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

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#### SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

#### 1.2 RELATED REQUIREMENTS

- A. Section 03 20 00 Concrete Reinforcement
- B. Section 03 30 00 Cast-In-Place Concrete
- C. Section 07 26 00 Under-Slab Vapor Retarder

#### 1.3 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM); latest version
  - 1. ASTM D226 Specification for Asphalt Saturated Organic Felt used in Roofing and Waterproofing
  - 2. ASTM D1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

#### 1.4 QUALITY ASSURANCE

A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood complying with Voluntary Product Standard PS 1-07 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

- C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Chamfer Strips: <sup>3</sup>/<sub>4</sub> inch by <sup>3</sup>/<sub>4</sub> inch wood, PVC, or rubber.
- E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.
- F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.
- G. Expansion Joint Material: Asphalt saturated fiberboard, ½ inch thick, meeting the requirements of ASTM D 1751.
- H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.
- I. Water stops: PVC, meeting the requirements of CRD-C572. Provide 6 inches wide dumbbell shape water stop with 3/16-inch minimum web thickness and 3/8 inch minimum end bulb diameter.
- J. Recycled Content: Minimum 5 percent post-consumer content, or minimum 20 percent pre-consumer recycled content at contractor's option.

#### PART 3 - EXECUTION

#### 3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

#### 3.2 PREPARATION

A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess formcoating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

#### 3.3 INSTALLATION

A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.

- B. Chamfer Strips: Provide at exposed corners and edges.
- C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
- D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

#### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.
- B. Water stops: Install according to manufacturers printed instructions. Splice water stop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.
  - 1. Place water stops in all concrete construction joints in basement walls around the building perimeter that are exposed to soil, weather, or moisture, and in any other construction joints that have the potential to allow water infiltration into the building.

#### 3.5 JOINTS

- A. Construction Joints in Elevated Slabs and Beams: Construction joints in Elevated Slabs, Beams, Grade Beams, and other flexural members shall only be made as shown in the contract drawings or as approved by the Engineer of Record. Joints shall be constructed in accordance with ACI 318 Section 6.4 with provisions made for the transfer of shear and other forces. Reinforcement shall be continuous through these joints unless noted otherwise.
- B. Construction Joints in Walls, Foundations, and Slabs on Grade: Provide keyways at least 1 ½ inches deep in vertical construction joints in walls and construction joints in slabs on grade and foundations. Discontinue every other horizontal bar through slab on grade construction joints unless noted otherwise.
- C. Preformed Construction Joint for Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 guage steel, galvanized splice plates.
- D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.
- E. Control Joints in Slabs-on-Grade:

- 1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.
- 2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/4 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.
- F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

#### 3.6 REMOVAL OF FORMWORK

- A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.
- C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

#### 3.7 RE-USE OF FORMS

- A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 031000

#### SECTION 032000 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

#### 1.2 RELATED REQUIREMENTS

- A. Section 03 10 00 Concrete Forming and Accessories
- B. Section 03 30 00 Cast In Place Concrete

#### 1.3 REFERENCE STANDARDS:

- A. American Concrete Institute (ACI), latest versions:
  - 1. ACI 301 Specifications for Structural Concrete for Buildings
  - 2. ACI 315 Details and Detailing of Concrete Reinforcement
  - 3. ACI 318 Building Code Requirements for Structural Concrete
- B. American Society for Testing and Materials (ASTM), latest versions:
  - 1. ASTM A82/A82M Standard Specification for Steel Wire, plain, for Concrete Reinforcement
  - 2. ASTM A185/A185M Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
  - 3. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- C. Concrete Reinforcing Steel Institute (CRSI). Design Handbook, latest version

#### 1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

#### PART 2 - PRODUCTS

- 2.1 MATERIALS
  - A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.
  - B. Welded Wire Fabric: ASTM A 185, flat sheets.
  - C. Steel Wire: ASTM A 82, 16 gage.

D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

#### 2.2 FABRICATION

- A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.
- B. Do not fabricate reinforcing steel until shop drawings are approved.

#### PART 3 - EXECUTION

#### 3.1 PLACING BAR SUPPORTS

- A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.
- B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

#### 3.2 PLACING REINFORCING STEEL

- A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".
- B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

1. Concrete Cover:	
Concrete cast against and permenently exposed to earth	
or weather	3 mones
Bars larger than No. 5	2 inches
Bars No. 5 or smaller	1 1/2 inches

- D. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.
- E. Welded Wire Fabric Splices: Lap one complete wire spacing.
- F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.
- G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches

from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

END OF SECTION 032000

#### SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section covers cast-in-place concrete including finishing, surface repair and curing.

#### 1.2 RELATED REQUIREMENTS

- A. Section 03 10 00 Concrete Forming and Accessories
- B. Section 03 20 00 Concrete Reinforcement
- C. Section 07 26 00 Under Slab Vapor Retarder

#### 1.3 REFERENCE STANDARDS

- A. Meet the requirements of the following codes, specifications and standards.
  - 1. American Concrete Institute (ACI) Publications, latest versions:
    - a. ACI 301 Specifications for Structural Concrete for Buildings
    - b. ACI 305.1 Standard Specification for Hot Weather Concreting
    - c. ACI 306.1 Standard Specification for Cold Weather Concreting
    - d. ACI 318 Building Code Requirements for Structural Concrete.
  - 2. ASTM International (ASTM), latest versions:
    - a. ASTM C31/C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
    - b. ASTM C33/C33M Standard Specification for Concrete Aggregates
    - c. ASTM C39/C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
    - d. ASTM C94/C94M Standard Specification for Ready-Mixed Concrete
    - e. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
    - f. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
    - g. ASTM C143/C143M Standard Test Method for Slump of Hydraulic Cement Concrete

- h. ASTM C150/C150M Standard Specification for Portland Cement
- i. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
- j. ASTM C172/C172M Standard Practice for Sampling Freshly Mixed Concrete
- k. ASTM C173/C173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- I. ASTM C231/C231M Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- m. ASTM C260/C260M Standard Specification for Air Entraining Admixtures for Concrete
- n. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- o. ASTM C330/C330M Standard Specification for Lightweight Aggregates for Structural Concrete
- p. ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete
- q. ASTM C567 Standard Test Method for Determining Density of Structural Lightweight Concrete
- r. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- s. ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

#### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.
- B. Concrete Mix Design:
  - 1. Submit mix design in accordance with ACI-301, Section 4.
  - 2. Submit with mix design results of laboratory tests performed within previous 12 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.
  - 3. Submit the proposed area of use for each mix design submitted (footings, stemwalls, slabs, walls, columns, etc.).
- C. Granular Base Course: Submit gradation, plasticity index, and wear information.
- D. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump. Submit copies of granular base course test reports.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment .Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities.
- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
  - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

#### PART 2 - PRODUCTS

- 2.1 MATERIALS
  - A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.
  - B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.
  - C. Water: Potable.
  - D. Air-Entraining Admixture: ASTM C 260.
  - E. Water Reducing Admixture: ASTM C 494.
  - F. Fly-Ash: ASTM C 618.
  - G. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.
  - H. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.

Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs. Curing compound to be used on integrally colored concrete slabs shall be approved by the manufacturer of the color.

- I. Vapor Retarder shall comply with Section 07 26 00 of these Specifications.
- J. Granular base shall meet the following grading requirements when tested in accordance with ASTM C 136.

Granular base shall meet the gradation and material properties requirements as listed in the General Structural Notes.

The plasticity Index shall be no greater than 3 when tested in accordance with ASTM D 4318. The coarse aggregate shall have a percent wear of 50 or less when tested in accordance with ASTM C 131

#### 2.2 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.
- B. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.
- C. Refer to the General Structural Notes for concrete strengths.
- D. Slabs-on-ground or on vapor retarder shall have a water/total cementitious ratio not to exceed 0.45.
- E. Admixtures
  - 1. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.
  - 2. All other admixtures shall have the written approval of the Architect or Structural Engineer.
  - 3. Calcium chloride is not permitted.
  - 4. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.

#### PART 3 - EXECUTION

#### 3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

#### 3.2 PREPARATION

A. Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

#### 3.3 CONCRETE PLACEMENT

A. General: Comply with ACI 301.

- B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.
- C. Maintain reinforcing in proper position during concrete placement operations.
- D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.
- F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.
- G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed. Comply with ACI 305R.

#### 3.4 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

#### 3.5 FINISH OF HORIZONTAL SURFACES

A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

#### 3.6 SLAB FINISHES

- A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding ¼ inch in 10 feet when tested with a 10 foot straightedge.
- B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.
- C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by a final hand-trowel operation, free of trowel marks, and uniform in texture and appearance. The final surface finish for slabs-on-grade shall have a

minimum FF = 25 and a minimum FL = 20 per ACI requirements. Verify with Architectural requirements.

D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

# 3.7 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days.
- B. Moisture-retaining Cover curing: All interior concrete slabs, except exposed integrally colored concrete slabs, are to be cured with a moisture retaining cover for the first 7 days. After that time, the cover shall be removed and the slab should be allowed to dry. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed. Repair any holes or tears in cover during curing period.
- C. Curing compound: At contractor's option, exterior concrete slabs may be cured using curing compound. All vertical concrete (walls, beams, etc...) shall be cured using curing compound apply compound to the vertical surface as soon as the forms are removed. Apply curing compound uniformly in accordance with the manufacturer's printed instructions. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs.
- D. Exposed integrally colored concrete slabs: Use curing compound recommended by the concrete supplier. Apply with an airless sprayer.

#### 3.8 CONCRETE SURFACE REPAIRS

A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tie rods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

#### 3.9 FOR EXPOSED-TO-VIEW SURFACES

A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

#### 3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172.
- C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
- D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.
- E. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.
- F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.

Slabs on Grade or Metal Deck	30 cubic yards
Footings and Stem Walls	50 cubic yards
All Other Locations (unless otherwise noted) 30 cubic yards	

- G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The Owner shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
- H. Granular Base Course: ASTM C 136 and ASTM D 4318 for every 500 square yards of building slab area.

END OF SECTION 033000

## **SECTION 03 3543**

## POLISHED CONCRETE FINISHING

#### PART 1 - GENERAL

#### 1.01 SUMMARY:

- A. Section Includes:
  - 1. Polished concrete finishing.
- B. Related Sections:
  - 1. Section includes polished concrete finishing and scoring.
  - 2. Concrete for polished concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 03 3000 "Castin-Place Concrete."

## 1.02 REFERENCES:

- A. American Concrete Institute (ACI):
  - 1. ACI 302.1R Guide for Concrete Floor and Slab Construction.
- B. ASTM International:
  - 1. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 2. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete.
  - 3. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
  - 4. ASTM D523 Standard Test Method for Specular Gloss
- C. National Floor Safety Institute (NFSI):
  - 1. NFSI Test Method 101-A Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes.

## 1.03 SYSTEM DESCRIPTION:

- A. Performance Requirements: Provide polished flooring that has been selected, manufactured and installed to achieve the following:
  - 1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.
  - 2. Reflectivity: ASTM D523, Specular gloss in accordance with architect's required gloss unit (GU) reading
  - 3. High Traction Rating: NFSI 101-A, non-slip properties.
- B. Design Requirements:
  - 1. Hardened Concrete Properties:

- a. Minimum Concrete Compressive Strength: 4000 psi (24 MPa).
- b. Normal Weight Concrete: No lightweight aggregate.
- 2. Placement Properties:
  - a. Natural concrete slump of 4 1/2 inches 5 inches (114 127 mm). Admixtures may be used.
  - b. Any admixtures, plasticizers, slag, fly ash or anything taking the place of Portland-based cement shall not exceed 20 percent, a straight cement mix is recommended
  - c. Flatness Requirements: Overall FF 50, Local FF 35.
  - d. Levelness Requirements:Overall FL 30, Local FL 20.
  - e. Hard-Steel Troweled (3 passes) Concrete: No burn marks. Finish to ACI 302.1R, Class 5 floor.
  - f. When placing edges use a 3 feet metal or wooden 2x4 screed and run parallel with form or edge after initial screed and before floating.
  - g. Hand floating shall be parallel to edge and done in 2 feet increments to avoid lifting or depressing edges. Do not reach out beyond 2 feet of edge with hand tools or float in a fan direction pulling excessive mud to the forms.
- 3. Curing Options:
  - a. Membrane forming curing compounds (polyethylene film not recommended.)
  - b. Damp Curing: Seven day cure.
- 4. Slab Protection Immediately Following Placement:
  - a. Silicone chalks should not be used. Red and yellow chalks are permanent dyes. Red chalk, black markers, wax pencils should not be used for framing. White or blue chalks are acceptable. Do not over mark for the framing. Do not use silicone sprays to "Hold" the lines because they repel the stain and leave permanent scars on the floor.
  - b. Do not use tape, glue, solvents, pine-sol, varnish, non-breathing plastics, liquid nail, silicone, plastics, nails, plumbers glue, foam insulation, bond release agents, flux, oils, grease, polyurethane, paint, markers (framers often write dimensions of doorways in marker on the slab. ask them to make that note on the wood framing the doorway), grease sticks, spray paints, crayons, muriatic acid, and other chemicals both before and after staining.
  - c. Do not lay wood, sheet goods, insulation boards, plywood, press board, drywall, sections of framing, and similar materials on the slab for extended periods of time. They can transfer resins and tannins into the slab and will alter the moisture content in the slab which leaves a pattern in the finished floor. Cardboard should be placed between the slab and the stacked material to minimize any unwanted transfers.
  - d. Do not allow food, beverages, oil, glass, metal, paint, caulk, or primers to come in contact with concrete slab.

# 1.04 SUBMITTALS:

- A. Product Data:
  - 1. Manufacturer's product data for specified products.
  - 2. Installation instructions including preparation and concrete grinding procedures.
  - 3. Certificates: Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.

Shop Drawings: Plan view of floor and joint pattern layout including dimensions and floor polishing schedule.

Installer Qualifications:

- 1. Provide project information and photographs of five successfully completed projects in similar scope and size as this Project.
- 2. Provide letter from manufacturer indicating that installer is approved or certified to install specified concrete polishing system.

## 1.05 CLOSEOUT SUBMITTALS:

- A. Warranty: Submit warranty documents specified.
- B. Manufacturer's instructions on maintenance renewal of applied treatments.

# 1.06 QUALITY ASSURANCE:

- A. Qualifications:
  - 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
  - 2. Installer trained and holding current certification in system to be applied or approved by manufacturer to install the specified system.
- B. Mock-Ups:
  - 1. Provide mock-up for new concrete and existing concrete.
  - 2. Each mock-up shall be 100 square feet sample slab showing each finish specified and joint construction between finishes. Mock-up slab shall be constructed under conditions similar to those which will exist during placement and finishing of concrete work of this Project. Mock-up shall be located at project site as directed by Architect.
  - 3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, and finish.
  - 4. Allow 48 hours for inspection of mock-up before proceeding with work.
  - 5. When accepted, mock-up will demonstrate minimum standard of quality required for this work. The approved mock-up will be integrated into the final installation.
- C. Preinstallation Meetings: Conduct a preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Review the following:
  - 1. Environmental requirements.
  - 2. Scheduling and phasing of work.
  - 3. Coordinating with other work and personnel.
  - 4. Protection of adjacent surfaces.
  - 5. Surface preparation.
  - 6. Repair of defects and defective work prior to installation.
  - 7. Cleaning.
  - 8. Installation of polished floor finishes.
  - 9. Application of liquid hardener, densifier.
  - 10. Protection of finished surfaces after installation.

## 1.07 DELIVERY, STORAGE & HANDLING:

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

Delivery: Deliver materials in manufacturer's original packaging with identification labels and seals intact.

Storage: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

- D. Protection: Protect concrete slab from petroleum stains, acids, acidic detergents, hydraulic fluids, and vehicular traffic. Restrict use of pipe cutting machinery and placement of reinforcing steel on slab.
- 1.08 SEQUENCING:
  - A. Sequence with Other Work: Comply with manufacturer's written recommendations for sequencing construction operations.

#### PART 2 - PRODUCTS

#### 2.01 CONCRETE POLISHING SYSTEM:

- A. Manufacturers:
  - 1. Ameripolish.
  - 2. American Decorative Concrete.
  - 3. Increte
  - 4. L&M
  - 5. Prosoco.
- B. All products related to the polished concrete process are to be manufactured by a single manufacturer and shall be compatible.
- C. Preparation Materials:
  - 1. At new concrete provide manufacturer recommended cleaner.
- D. Hardener / Densifier: Water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film. Silicate or amorphous silica designed specifically to be used in conjunction with concrete polishing. No siliconate hardener will be accepted.
- E. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
- F. Protective Sealer: Penetrating concrete sealer designed specifically to be used in conjunction with polished concrete.
- 2.02 CONCRETE DYE
  - A. Concrete Dye: Fast-drying, solvent-based dye, packaged in premeasured units ready for mixing with water or VOC exempt solvent; formulated for application to polished cementitious surfaces with UV stabilizers designed to help protect colorant from fading.
    - 1. Colors: Refer to Section 09 0601 Finish Schedule Key for colors and locations of use.

#### 2.03 POLISHED CONCRETE SYSTEM EQUIPMENT

A. Floor grinding machine: Floor grinding machine shall be specifically designed to grind, and polish concrete floors. Floor grinding machine will have multiple heads, be counter rotating, have variable speeds, and have at least 600 pounds down pressure. If dry grinding, honing or polishing, use a machine with a dust extraction system and squeegee attachments with flow rates suitable for dust generated.

B. Edge grinding and polishing equipment: Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.

C. Diamond tooling: For polishing shall be high quality resin and/or metal bonded diamonds (matched sets only) that provide a high level of polish to the interior floor surface.

- D. High speed propane burnisher: For the final buffing operation using diamond impregnated buffing pad.
- E. Burnishing pads: Maintenance pads for use with high speed burnishing equipment.

#### 2.04 FINISH:

- A. Sheen: Test in accordance with ASTM D523 test method. Provide results to Architect, General Contractor, and Owner within 24 hours of completion. A minimum of 10 samples must be taken from each section of project to obtain an accurate average. Minimum will be no less than 85 percent of specified finish for any single test.
  - 1. Matte Finish, 30 GU @ 60°.
  - 2. Semi-gloss, 45 GU @ 60°.
  - 3. High gloss, 60 GU @ 60°.
- B. Aggregate Exposure:
  - 1. Minimal exposure: No more than 1/8 inch aggregate to be exposed.
  - 2. Medium exposure: 1/4 inch to 3/8 inch aggregate to be exposed.
  - 3. Heavy exposure: 1/2 inch to 3/4 inch aggregate to be exposed.

#### 2.05 SCORING

A. Scoring: Score decorative jointing in concrete surfaces 1/16 inch deep with diamond blades to match pattern indicated. Rinse until water is clear. Score after staining.

B. Joint Width: 3/8 inch.

#### PART 3 - EXECUTION

#### 3.01 EXAMINATION:

- A. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.
- B. Verify Concrete Slab Performance Requirements:
  - 1. Verify concrete is cured to 28 day, 4000 psi strength.
  - 2. Verify concrete surfaces received a hard steel-trowel finish (3 passes) during placement.

#### 3.02 PREPARATION

- A. Ensure surfaces are clean and free of laitance, glaze, efflorescence, curing compounds, formrelease agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.
- B. Examine surface to determine soundness of concrete for polishing.

C. Repair bugholes, imperfections, and spall using repair material per manufacturer's instructions.

## 3.03 JOINT FILLER INSTALLATION

- A. Concrete must be at least 90 days old before application of joint filler. When possible concrete should be climatized for at least two weeks prior to the application of joint filler. If joint filling must occur prior to climatizing the building, separation may occur between the concrete and the joint filler.
- B. Joints must be clean and free of dirt, debris, curing compound, oil, paint, and anything else that will inhibit bond.
- C. Fill control and construction joints fully with joint filler. Pre-filling with sand, backer rod or any other material is not permitted.

## 3.04 POLISHING PROCESS:

- A. Floor surface polishing and treatment:
  - 1. Provide polished concrete floor treatment in entirety of slab as indicated by drawings. Provide consistent finish in all contiguous areas.
  - 2. Apply floor finish prior to installation of fixtures and accessories.
  - 3. Diamond polished concrete floor surface with planetary grinding machine with a minimum head pressure of 600lbs. Sequence with coarse to fine grit.
    - a. Comply with manufacturer's recommended polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
    - b. Expose aggregate in concrete surface as determined by approved mock-up.
    - c. All concrete surfaces shall be as uniform in appearance as possible with no visible scratches anywhere in surface.
  - 4. Grind and polish edges to a maximum of 1/8 inch of walls to match field area of floor.
  - 5. Edge into corners with a maximum of 5 inch diameter grinding and polishing disks.
  - 6. Apply silicate densifier/hardener per manufacturer's specification.
  - 7. Remove defects and re-polish defective areas.
  - 8. Finish edges of floor adjoining other materials in a clean and sharp manner.
- B. Concrete Sealer
  - 1. No topical sealer allowed.
  - 2. The appearance of any streaking or swirling from the use of topical sealing products will not be accepted. Identification of such issues will require the surface to be ground off and re-polished.
- C. Dyed and polished concrete
  - 1. Locate demarcation line between dyed surfaces and other finishes.
  - 2. Apply dye per manufacturer's specification.
- D. Polish Guard
  - 1. Uniformly apply and remove excessive liquid according to manufacturer's instructions.
  - 2. Using burnishing equipment and finest grit burnishing pads, burnish to uniform sheen matching approved mock-up.
- E. Final Polish

- 1. Class C Medium Aggregate Finish: Remove not more than 1/8 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying medium aggregate with no, or small amount of, large aggregate at random locations.
- 2. Level 1 Low Gloss Appearance:
  - a. Procedure: Not less than 4 step process with full refinement of each diamond pad up to 400 grit resin bonded pad with one application of densifier.
  - b. Gloss Reading: Not less than 40 according to ASTM E 430 before polish guard application.
- 3. Level 3 High Gloss Appearance:
  - a. Procedure: Not less than 6 steps with full refinement of each diamond pad up to 1500 grit resin bonded pad with one application of densifier.
  - b. Gloss Reading: Not less than 60 according to ASTM E 430 before polish guard application.

#### 3.05 ADJUSTMENTS:

A. Re-finish and polish areas which do not meet the specified gloss levels on mock-up. Fill joints flush to surface.

## 3.06 PROTECTION:

- A. Protect installed product from damage during construction in accordance with manufacturer's instructions.
- B. Do not lay wood lumber, sheet goods, insulation boards, plywood, press board, drywall, framing, and similar materials on the slab for extended periods of time. They can transfer resins and tannins into the slab. This will alter the moisture content in the slab which leaves a pattern in the finished floor. Cardboard should be placed between the concrete slab and any stacked material to minimize any unwanted transfers.
- C. Do not allow food, beverages, oil, paint, caulk, primers, and other stain causing materials to come in contact with concrete slab.
- D. Immediately following polishing, cover floor with vapor barrier and impact protection to protect against any spills, flooding, impact, metal, or any other potentially damaging occurrence. Provide acceptable flooring protection and upkeep as necessary.
- E. Do not tape directly to the floor. Do not use Duct Tape, Masking Tape, Packaging Tape, Strap Tape, Blue Tape, Green Tape, and Electrical Tape - NO exceptions. The tape alters the natural curing process and transfers chemicals to and from the slab. Tape, Plastics and other Adhesives can contribute to Plasticizer Migration. Imperfections created from tapes, plastics, and other adhesives is not acceptable.

## END OF SECTION

## SECTION 042200 - REINFORCED UNIT MASONRY

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section includes the construction of reinforced hollow core unit masonry, masonry veneer and special shapes. It includes all split face units and smooth face units, as well as masonry mortar and grout.

## 1.2 RELATED REQUIREMENTS

- A. Section 03 20 00 Concrete Reinforcement
- B. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
- C. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- D. Division 07 Section "Fire stopping" for fire stopping at tops of masonry walls and at openings in masonry walls.
- E. Division 08 Section "Louvers and Vents" for wall vents (brick vents).
- F. Products furnished, but not installed, under this Section include the following:
  - 1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel" and Division 13 Section "Metal Building Systems".
- G. Products installed, but not furnished, under this Section include the following:
  - 1. Cast-stone trim, furnished under Division 04 Section "Cast Stone".
  - 2. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications".
  - 3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Fabrications".
  - 4. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Steel Doors and Frames".

## 1.3 REFERENCE STANDARDS

- A. ASTM International (ASTM), latest versions;
  - 1. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 2. ASTM C90 Standard Specification for Load bearing Concrete Masonry Units
  - 3. ASTM C780 Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Pain and reinforced Masonry
  - 4. ASTM C270 Standard Specification for Mortar for Unit Masonry
  - 5. ASTM C476 Standard Specification for Grout for Masonry

- 6. ASTM C1019 Standard Test Method for Sampling and Testing Grout
- B. American Concrete Institute (ACI), latest versions:
  - 1. ACI 530.1 Specification for Masonry Structures

#### 1.4 SUBMITTALS

- A. Product Data: Submit sample of exposed masonry unit of each color and texture to be used to complete the work. Submit copies of test reports performed within last 12 months for representative specimens to be used in accordance with ASTM C 140 for strength, absorption and moisture content, and ASTM C 426 for drying shrinkage.
- B. Test Reports: Submit copies of test reports for masonry units, mortar and grout.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units above ground on level platforms, which allows air circulation under stacked units.
- B. Cover and protect against wetting prior to use.
- C. Handle units on pallets or flat bed barrows.
- D. Store cementitious ingredients in weather-tight enclosures.
- E. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
  - 1. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
    - a. Fold up metal banding; flatten and place in designated area for recycling.
    - b. Collect wood packing shims and pallets; place in designated area.
  - 2. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.
  - 3. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil contaminated sand, by crushing and mixing with fill material as fill is placed.
    - a. Crush masonry waste to less than 2 inches in greatest dimension.
    - b. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 31 Section "Earth Moving".
    - c. Do not dispose of masonry waste as fill within 18 inches of finished grade.

4. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Owner's property.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. Hollow Core Split Faced Scored Units: ASTM C 90.
- B. Hollow Core Units: ASTM C90.
- C. Aggregate: Natural color at concealed block.
- D. Mortar: ASTM C 270 "Standard Specification for Mortar for Unit Masonry," Type S, f'c = 1800psi.
- E. Grout: ASTM C 476 "Standard Specification for Grout for Masonry."
- F. Cell Reinforcing: ASTM A 615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," Grade 60. Comply with Section 03 20 00.
- G. Bond Beam and Lintel Reinforcing: ASTM A 615, Grade 60. Comply with Section 03 20 00.
- H. Joint Reinforcing: Hot Dipped Galvanized, Standard Ladder Type 9 Gage Wire Dur-O-Wal or approved equal.
- I. Control Joint Material: Rubber, neoprene or PVC joint material for use with standard sash block by Dur-O-Wal or approved equal.
- J. Vertical Bar Positioner: Steel by Dur-O-Wal or approved equal.
- K. Mortar Plasticizer: Easy Spread by American Colloid Company or approved equal.

## PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Provide jamb, header, lintel, bond beam, etc. units as required to complete the work. Lay only dry and unfrozen masonry units.
- B. All exposed masonry shall be scoria aggregate, split face, scored finish unless noted otherwise on the drawings. Masonry not exposed to view may be smooth finished.
- C. Discard any broken, chipped, or discolored masonry units.
- D. Use masonry saws to cut and fit masonry units.
- E. Lay units in running bond pattern with vertical joints located at center of masonry units in alternate course below.

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- F. Set units plumb, true to line and with level courses accurately spaced.
- G. Adjust masonry unit to final position while mortar is soft and plastic.
- H. Anchors, flashing accessories and similar devices shall be built in as masonry progresses.

#### 3.2 MORTAR

- A. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of 5 minutes. Adjust the consistency of the mortar to the satisfaction of the mason, but add only as much water as is compatible with convenience in using the mortar. If the mortar begins to stiffen from evaporation or from absorption of a pat if the mixing water, re-temper the mortar immediately by adding water, and remix the mortar.
- B. Mortar for exterior walls shall have waterproofing added in accordance with the manufacturer's recommendations.
- C. Addition of admixtures or re-tempering of mortar at the mixer to extend its use will not be permitted.

#### 3.3 RE-TEMPERING

A. All mortar shall be used within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set. Re-tempering of mortar in which setting has saturated will not be permitted. However, mortar shall be re-tempered, except as above qualified, as necessary to keep it plastic.

#### 3.4 JOINTS

- A. Provide joints 3/8 inch nominal thickness and tooled unless shown otherwise on drawings.
- B. Construct uniform joints.
- C. Units shall be placed with sufficient pressure to extrude mortar and provide a tight joint.

#### 3.5 REINFORCEMENT

- A. Reinforcement shall be secured against displacement prior to grouting at a spacing not greater than 4 feet.
- B. Provide rebar lap lengths specified in the General Structural Notes on the drawings. Provide 6 inches minimum lap for all ladder type joint reinforcing.

#### 3.6 GROUTING

A. Grout all cells, which are below grade.

- B. Grout lintel blocks over masonry openings and each jamb of masonry openings.
- C. Grout pours shall not exceed 5 feet in height.
- D. Grout all cells solid, which contain reinforcing.

Grout shall have a slump range of 8 to 11 inches tested in accordance with ASTM C143.

Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred. Typically this occurs within 2-4 minutes of placement of grout.

Place grout within 1-1/2 hours from introducing water in the mixture and prior to initial set.

#### 3.7 POINTING AND CLEANING

- A. At completion of unit masonry work, fill holes in joints and tool.
- B. Cut out and repoint defective joints.
- C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

#### 3.8 PROTECTION OF WORK

- A. Protect sills, ledges, and offsets from mortar drippings or other damage during construction.
- B. Remove misplaced mortar or grout immediately.
- C. Cover top of walls with non-staining waterproof coverings when work is not in progress.
- D. Provide adequate bracing during construction to prevent damage from wind loads.

## 3.9 WEATHER CONDITIONS

- A. Do not place concrete masonry units when air temperature is below 20 degrees F.
- B. For temperatures between 20 degrees F and 40 degrees F, sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Mortar shall be maintained above 32 degrees F during placement.
- C. Masonry shall be protected from freezing for 24 hours after placement.

3.10 FIELD QUALITY CONTROL REINFORCED UNIT MASONRY 042200 - 5

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Concrete Masonry Units (CMU): Test in accordance with ASTM C 140. "Standard Test Methods of Sampling and Testing Concrete Masonry Units." Six units shall be sampled and tested for each lot of 10,000 units or less delivered to the job site. Twelve units shall be sampled from each lot of more than 10,000 units and less than 100,000 units.
- C. Mortar: By proportions according to ASTM C 780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Masonry."
- D. Grout: Mold and test 4 test specimens in accordance with ASTM C 1019 "Test Method for Sampling and Testing Grout" from each day's grout placement. Test grout slump prior to each day's grouting process. Submit slump value with test specimen results. See General Structural Notes for required strength.

END OF SECTION 042200

## SECTION 051000 - STRUCTURAL STEEL

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section includes the fabrication and erection of structural steel.

## 1.2 RELATED REQUIREMENTS

- A. Section 05 21 00 Steel Joists
- B. Section 05 30 00 Metal Deck
- C. Section 09 90 00 Painting and Coating

# 1.3 REFERENCE STANDARDS:

- A. ASTM International (ASTM), latest versions:
  - 1. ASTM A36/A36M Standard Specification for Carbon Structural Steel
  - 2. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded Seamless
  - 3. ASTM A61/A61M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
  - 4. ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - 5. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  - 6. ASTM A490 Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
  - 7. ASTM A500-A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  - 8. ASTM A992/A992M Standard Specification for Structural Steel Shapes
  - 9. ASTM C1107/C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (non-shrink)
  - 10. ASTM F1554 AE1 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- B. American Welding Society (AWS), latest edition
  - 1. AWS D1.1 Structural Welding Code-Steel
- C. American Institute of Steel Construction (AISC), Steel Construction Manual, latest edition.
  - 1. Specification for Structural Steel Buildings
  - 2. AISC Code of Standard Practice
  - 3. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

## 1.4 QUALITY ASSURANCE

- A. Qualifications of Fabricator: Fabricator shall have a minimum of 5 years experience in the fabrication of structural steel of structures of similar size. Fabricator shall have AISC or IAS certification or other certification as approved by the building official and the engineer of record. If the fabricator does not have approved certification, special inspection shall be done on the fabrication process and on the fabricated material as required by Section 1704.2, Inspection of Fabricators of the International Building Code. The non-certified fabricator shall engage a special inspector that meets the requirements of IBC section 1704.1 and is acceptable to the building official and the engineer of record. Provide documentation verifying certification or provide special inspector information for approval prior to issuance of a building permit.
- B. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel of structures of similar size.
- C. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.

## 1.5 SUBMITTALS

- A. Shop Drawings: Submit shop drawings including erection plans, complete details and schedules for fabrication and assembly of structural steel members. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Shop drawings shall not be made by reproduction of the Contract Drawings.
- B. Provide setting drawings and directions for installation of anchor bolts and other anchorages to be installed by others.
- C. Welder Certification: Submit affidavit stating that all welders are certified in accordance with AWS and provide copies of welder's certificates.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support structural steel above ground on skids, pallets, platforms, or other supports.
- B. Protect steel from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- E. Replace damaged shapes or members.
- F. Waste Management and Disposal; As specified in Division 01 Section "Construction Waste Management" and as follows: Collect cut offs and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

## PART 2 - PRODUCTS

#### 3.1 MATERIALS

- A. All Wide Flange Shapes shall conform to ASTM A 992, Grade 50 unless noted otherwise.
- B. All Angles, Channels, Plates, and Bars: ASTM A 36.
- C. Structural Steel Pipe: ASTM A 53, Type E or S, Grade B Fy=35 ksi
- D. Rectangular or Square Hollow Structural Section: ASTM A 500, Grade B, Fy=46 ksi.
- E. Round Hollow Structural Sections: ASTM A 500, Grade B, Fy=42 ksi.
- F. Anchor Bolts: ASTM F1554, Grade 36
- G. High Strength Tension Control Threaded Fasteners: Meet requirements of ASTM A 325 or ASTM A 490.
- H. Headed Anchor Shear Studs: By the Nelson Division of TRW.
- I. Welding Electrodes: E 70 Series.
- J. Shop Primer Paint: Fabricators standard rust inhibitive primer.
- K. Non-Metallic, Non-Shrink Grout: Meets the requirements of ASTM C 1107.
- L. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time. Grout shall have a minimum 28 day compressive strength of 6,000 psi.
  - 1. Subject to compliance with requirements, provide products by one of the following or an approved equal:
    - a. Five Star Fluid Grout 100; Five Star Products, Inc., Fairfield, Connecticut.
    - b. Crystex; L&M Construction Chemicals, Inc. Omaha, Nebraska.
    - c. Sure-Grip High Performance Grout; Dayton superior Corp., Miamisburg, Ohio.
    - d. Sonnogrout 10K; Sonneborn Building Products, Shakopee, Minnesota.
    - e. Sealight Pac-It Grout; W.R. Meadows, Inc., Hampshire, Illinois.
    - f. Enduro 50; Conspec Marketing & Manufacturing Co., Inc, Kansas City, Kansas.

- A. Fabrication shall be in accordance with the AISC "Code of Standard Practice for Buildings and Bridges".
- B. Connections: Weld or bolt shop connections as indicated on the approved shop drawings. Design connections to support reactions and forces where indicated on the drawings.
- C. Shop Welds: Shall be visually inspected by the Fabricator's quality control department.

#### 3.3 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete, mortar or to receive sprayed on fireproofing. Paint embedded steel, which is partially exposed on exposed portions and initial 2 inch of embedded areas only.
- B. Do not paint surfaces, which are to be welded or high-strength bolted with frictiontype connections.
- C. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
  - 1. SP-1 "Solvent Cleaning"
  - 2. SP-2 "Hand Tool Cleaning"
  - 3. SP-3 "Power Tool Cleaning". For Architecturally Exposed Structural Steel, AESS, see Architectural drawings for locations.
- D. Painting: After surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Provide one coat.

#### PART 3 - EXECUTION

#### 4.1 COORDINATION

- A. Field Measurements: Verify all elevations, locations, and dimensions of surfaces to receive structural steel.
- B. Anchor Bolts and Other Embedded Items: Verify locations and positions of anchor bolts and other embedded items used to support structural steel.

All Anchor bolts for column base plates, anchors and bearing plates for beams shall be located prior to installation by a Registered Professional surveyor. The Professional Surveyor shall use project control points, such as bench marks, grid lines, or building corners established and accurately maintained by the General Contractor for vertical and horizontal control of location. Templates shall be used to locate groupings of bolts or anchors and shall be confirmed as to orientation and hole geometry accuracy

Anchor bolts and bearing plates with anchors shall be stabilized against movement, vertical and horizontal, prior to and during concrete casting of concrete supporting these devices.

Upon completion of the concrete casting the Professional Surveyor shall verify vertical and horizontal locations and orientation of anchor bolts or bearing plates with anchors. A report shall be furnished to the Engineer of Record (through the General Contractor and Architect) noting non compliant locations. The EOR, will furnish remedial actions required to correct the non compliant anchor bolt or bearing plate locations. Allow ten days for the EOR's report on remedial actions necessary

It shall be the General Contractor's responsibility to have this work performed.

C. Correct any unsatisfactory conditions prior to erection of structural steel.

#### 4.2 PREPARATION

A. Clean surfaces to receive structural steel prior to erection.

#### 4.3 ERECTION

- A. General: Erect structural steel in accordance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Field Assembly: Assemble structural steel accurately to the lines and elevations shown on the drawings. Align and adjust components accurately before fastening.
- C. Temporary Bracing: Provide temporary bracing or guys to secure structural steel against wind, seismic, or construction loads. It is the responsibility of the Contractor to maintain stability of the structure during erection.
- D. Field Bolted Connections: Install high strength tension control bolts in accordance with AISC Specifications for Structural Joints Using ASTM A325 and A490 Bolts and the manufacturer's instructions. Where clearance within a connection does not permit the use of tension control bolts, standard A325 bolts shall be used and inspected in accordance with the AISC Specification for Structural Joints.
- E. Field Welding: Perform all welds in accordance with AWS.
- F. Welded Connections: Field welds shall be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94

- G. Gas Cutting: Do not use gas-cutting torches in field to cut structural framing.
- H. Do not enlarge unfair holes by burning. Ream holes that must be enlarged to admit bolts.
- I. Field Touch-up Painting (Primer): Paint all exterior exposed bolts, washers, and nuts after connections have been tightened and checked. Paint all exterior exposed field welds. Paint all exterior exposed abrasions in shop coat. Use same paint as for shop painting.
- J. Grout Placement: Comply with the manufacturer's instructions.
- K. Tighten anchor bolts after supported members have been positioned and plumbed.

END OF SECTION 051000

## SECTION 053000 - METAL DECKING

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. Provide all metal decking complete in place as shown on the drawings, specified herein, and needed for a complete and proper installation.

#### 1.2 RELATED REQUIREMENTS

- A. Section 05 10 00 Structural Steel
- B. Section 05 21 00 Steel Joists
- C. Section 05 40 00 Cold-Formed Metal Framing

## 1.3 REFERENCE STANDARDS:

- A. ASTM International, latest versions
  - 1. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability
  - 3. 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.
- B. American Welding Society (AWS), latest edition.
  - 1. D1.3 Structural Welding Code Sheet Steel
- C. Steel Deck Institute.
  - 1. SDI Design Manual for Floor Decks, Form Decks and Roof Decks
  - 2. SDI Diaphragm Design Manual Third Edition

#### 1.4 QUALITY ASSURANCE

- A. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.3 within the last 12 months.
- 1.5 SUBMITTALS
  - A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Shop Drawings shall not be made by reproduction of the Contract Drawings.

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support metal deck above ground on skids, pallets, platforms or other supports.
- B. Protect metal deck from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
  - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Metal Roof Deck: ASTM A 1008, Grade C. See plans for type, size and finish. Metal deck used in fire rated assemblies shall meet the requirements of UL. The UL mark on the product will be accepted as evidence of compliance.
- B. Metal Floor Deck: ASTM A 1011 with galvanized finish. See plans for type and size.
- C. Finishes:
  - 1. Painted: Manufacturer's baked-on, rust-inhibitive paint.
  - 2. Galvanized: Conform to ASTM A 653, G60.

# PART 3 - EXECUTION

#### 3.1 COORDINATION

A. All edge angle shall be in place with proper attachment prior to installation of metal deck. All roof and floor opening frames shall be installed prior to deck installation.

#### 3.2 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein. Locate deck bundles to prevent overloading of structural members.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks. METAL DECKING

- C. Place deck units in straight alignment for entire length of run.
- D. Place deck units flat and square secured to adjacent framing without warp or excessive deflection.
- E. Lap ends of deck units a minimum of 2 inches over supports.
- F. Place deck units to permit proper attachment to the perimeter deck angle.
- G. Do not use deck units for storage or working platforms until permanently secured.
- H. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- I. Fasten deck units to steel supporting members as shown on the structural drawings.
- J. Fasten side laps of units as called for on the structural drawings.
- K. Care shall be exercised in the selection of electrodes and amperage to provide positive welds and to prevent high amperage blowholes.
- L. Comply with AWS D1.3 requirements and procedures.
- M. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.
- N. Install closure strips at all locations as recommended by the manufacturer to provide a complete installation.
- O. Provide cleaning and touch-up painting of field welds, abraded areas and rust spots, as required for all exposed areas after erection and before proceeding with field painting.

END OF SECTION 053000

## SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. This section includes all lightgage studs, joists and track, 20 gage or heavier, including bridging, and related accessories as indicated on the Contract Drawings and specified herein.

## 1.2 RELATED REQUIREMENTS

- A. Section 05 10 00 Structural Steel
- B. Section 05 21 00 Steel Joists

#### 1.3 REFERENCE STANDARDS:

- A. American Iron and Steel Institute (AISI) North American Specification for the Design of Cold-Formed Steel Structural Members, latest version.
- B. American Welding Society of (AWS) D1.3, Structural Welding Code-Sheet Steel.
- C. ASTM International, latest version
  - 1. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability
  - 3. 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

#### 1.4 QUALITY ASSURANCE

- A. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel of structures of similar size.
- B. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.

## 1.5 SUBMITTALS

A. Submit manufacturer's product information and installation instructions for each item of lightgage framing. Submit shop drawings for all prefabricated lightgage systems.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings.
- B. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
  - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Metal Framing:
  - 1. All 12, 14, and 16 gage steel studs and joists shall be formed from steel that meets the requirements of one of the following standards with a minimum yield strength of 50,000 psi:
    - a. Painted Material ASTM A 1011, Grade 50.
    - b. Galvanized Material ASTM A 653 Grade 50.
  - 2. All 18 and 20 gage steel studs and joists; all track, bridging and accessories shall be formed from steel that meets the requirements of one of the following with a minimum yield strength of 33,000 psi:
    - a. Painted Material ASTM A 1008, Grade C.
    - b. Galvanized Material ASTM A 653.
- B. Material Finishes: All stud and joist components shall be primed with paint meeting the performance requirements of TT-P-1636C, or shall be formed from steel having a G-60 galvanized coating or better.

#### 2.2 FABRICATION

- Framing components may be prefabricated into panels prior to erection.
   Prefabricated panels shall be square, with components attached to prevent racking.
   Handling and lifting of panels shall be done in a manner as to not cause distortion in any member.
- B. All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.

#### PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal framing systems in accordance with manufacturer's printed instructions and recommendations, unless otherwise indicated on Contract Drawings.
- B. Install and align tracks accurately to layout at base and tops of studs. Secure tracks as indicated on Contract Drawings. Provide fasteners at corners and ends of tracks.
- C. Install supplementary framing, blocking and bracing in metal framing system to support fixtures, equipment, etc. Comply with stud manufacturer's recommendations and industry standards, considering weight and loading of each item.
- D. Secure studs to top and bottom tracks by welding at both inside and outside flanges or with a minimum of 2-#8 self tapping screws (one per flange) up to 16 gage material and 2-#10 self tapping screws (one per flange) for 14 gage and thicker, unless noted otherwise.
- E. Frame wall openings larger than 2 foot-0 inches square with double studs at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.
- F. All components of build-up stud sections, including jack studs, full height studs, columns, headers, etc. shall be welded together with utilizing 1/8" fillet welds 1" long at 12" on center along the full height of each flange to flange connection unless noted otherwise.
- G. Install horizontal bridging in stud system, spaced (vertical distance) at no more than 4 foot 0 inches o.c. Weld at each intersection.
- H. Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces, such as zinc-rich paint.

END OF SECTION 054000

# SECTION 055100 - METAL STAIRS

# PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Fixed aluminum wall ladders.
- B. Fixed aluminum ship's ladders.

# 1.2 RELATED SECTIONS

- A. Section 055000 Metal Fabrications: Catwalks and fire escapes.
- B. Section 061000 Rough Carpentry: Blocking in metal wall studs and partitions for anchorage of access ladders
- C. Section 064350 Rolling Library Ladders.

# 1.3 REFERENCES

- A. ANSI A14.3 American National Standard for Ladders -- Fixed -- Safety Requirements; 1992.
- B. ASTM B 209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2001.
- C. ASTM B 209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2001.
- D. ASTM B 210 Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2002.
- E. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2000.
- F. ASTM B 221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2000.
- G. ASTM B 308 Standard Specification for Aluminum Alloy T6061-T6 Standard Structural; 2002
- H. ASTM B 308M Standard Specification for Aluminum Alloy T6061-T6 Standard Structural; 2002
- I. OSHA 29 CFR Standard 1910.27 Fixed ladders; Occupational Safety and Health Standards; current edition

# 1.4 SUBMITTALS

- A. Submit under provisions of Section 013000.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Detailed drawings showing complete dimensions, all materials, mounting attachments, and fabrication details.

# 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the engineering and manufacturing of metal ladders, with not less than fifty years of experience.

# 1.6 WARRANTY

- A. See Section 017800 Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's standard limited five-year warranty against defects in materials and workmanship.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: ALACO Ladder Co., which is located at: 5167 G St.; Chino, CA 91710-5143; Toll Free Tel: 888-310-7040; Tel: 909-591-7561; Fax: 909-591-7565; Email:request info (sales@alacoladder.com); Web:http://alacoladder.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 016000.

## 2.2 MATERIALS

- A. Extruded Aluminum Profiles: ASTM B 221/B 221M, ASTM B 210, ASTM B 308/B 308M, Alloy 6061-T6; standard mill finish.
- B. Aluminum Sheet and Plate: ASTM B 209/B 209M, Alloy 6061-T6; standard mill finish.
- C. Fasteners: Aluminum solid aircraft rivets rated at 300 lbs (1335 N) shear strength.
- D. Cast fittings, connectors and rung ends: Cast Aluminum alloy 356

# 2.3 LADDERS

- A. Ladders General: Comply with ANSI A14.3 and OSHA regulations.
- B. Fixed Wall Ladders: Extruded aluminum; serrated rungs 1-1/8 inches (29 mm) in diameter, connected to 2-7/8 inch (73 mm) side rail channels with cast aluminum rung connectors, each secured to rails by means of four solid aircraft rivets.
  - 1. Hatch Access: Provide ladder side rail with rubber end caps and end with sufficient clearance for hatch to properly close.
- C. Ship's Ladders: 24 inches (610 mm) wide.
  - 1. Capacity: 500 lbs (225 kg).
    - a. Slope: 70 degrees;
      - 1) For Ladders 10 Feet and Greater: 4-inch (102 mm) wide aluminum steps mounted on 12 inch (305 mm) centers to 4-1/8 inch (105 mm) aluminum side rails.
  - 2. Fasten each step with not less than eight aluminum aircraft rivets.
  - 3. Provide handrails of 1-1/4 in (32 mm) round serrated aluminum tubing with cast or extruded aluminum fittings.
  - 4. Furnish ladder with four mounting brackets.
- 2.4 FINISHES
  - A. Factory finish all aluminum surfaces with manufacturer's standard powder coating system.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

## 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, and in compliance with ANSI A14.3 and OSHA 1910.27.

## 3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 055100

# SECTION 061000 - ROUGH CARPENTRY

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Rooftop equipment bases and support curbs.
  - 2. Wood blocking , cants, and nailers.
  - 3. Wood furring and grounds.
  - 4. Wood sleepers.
  - 5. Plywood backing panels.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- 1.3 INFORMATIONAL SUBMITTALS
- 1.4 QUALITY ASSURANCE
  - A. <a><br/>
    <u><Click to insert sustainable design text for manufacturer qualifications.></u></a>
  - B. <a><br/>
     </a>
     Click to insert sustainable design text for vendor qualifications.>

# PART 2 - PRODUCTS

- 2.1 WOOD PRODUCTS, GENERAL
  - A. <a><br/>
    <u><Click to insert sustainable design text for regional materials.></u></a>
  - B. <a><br/>
     </a>
     Click to insert sustainable design text for certified wood.>
  - C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
    - 1. Factory mark each piece of lumber with grade stamp of grading agency.
    - 2. For exposed lumber indicated to receive a stained or natural finish, [or] omit grade stamp and provide certificates of grade compliance issued by grading agency.
    - 3. Dress lumber, S4S, unless otherwise indicated.

## ROUGH CARPENTRY 061000 - 1

- D. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less; no limit for more than 2-inch nominal thickness unless otherwise indicated.
- E. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

# 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.

## 2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
  - 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
  - 2. Eastern softwoods; No. 2 Common grade; NeLMA.

## ROUGH CARPENTRY 061000 - 2

- 3. Northern species; No. 2 Common grade; NLGA.
- 4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

# 2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

# 2.5 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressurepreservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

# 2.6 METAL FRAMING ANCHORS

- A. <a><br/>
   </a>
   <a></a>
   <a>
   <td
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those [of products of manufacturers listed]. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.

# ROUGH CARPENTRY 061000 - 3

# 2.7 MISCELLANEOUS MATERIALS

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservativetreated lumber.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.

## 3.2 PROTECTION

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

END OF SECTION 061000

# ROUGH CARPENTRY 061000 - 5

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SECTION 061600.13 - SHEATHING (ADVANTECH®)

PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Wall sheathing.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

## 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.
- B. Code Compliance: Comply with requirements of the following:
  - 1. International Code Council Evaluation Service, ICC-ES ESR-1785.
  - 2. Voluntary Product Standard, DOC PS2-10, "Performance Standard for Wood-Based Structural-Use Panels."

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Outdoor Storage: Comply with manufacturer's recommendations:
  - 1. Set panel bundles on supports to keep off ground.
  - 2. Cover panels loosely with waterproof protective material.
  - 3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
  - 4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.
## 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring and sheathing system that fail due to manufacturing defects within specified warranty period.
  - 1. For subflooring and roof and wall sheathing applications, manufacturer shall warrant that the panels will not delaminate nor require sanding due to moisture absorption during installation within 500 days of purchase.
  - 2. Warranty Period: Lifetime beginning at date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

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

### 2.2 WOOD PANEL PRODUCTS

- A. Oriented Strand Board: DOC PS 2-10.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.
- C. Factory mark panels to indicate compliance with applicable standard.

### 2.3 WALL SHEATHING

- A. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC: Advantech® Sheathing or a comparable product by one of the following:
    - a. <Insert manufacturer name>.
  - 2. Span Rating, Panel Grade: Not less than 40/20, Structural 1, 5/8 Performance Category.
  - 3. Edge Profile: [Square edge] .
  - 4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-incheson center spacing.
  - 5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1785.
  - 6. Exposure Time: Designed to resist weather exposure for 300 days.

### Church Rock Phase II Factory | Church Rock, NM PRODUCT MASTERSPEC LICENSED BY DELTEK, INC. TO HUBER ENGINEERED WOODS;

### 2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.

## 2.5 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Subfloor Panels to Wood Framing: [**Polyurethane-based**] formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech<sup>™</sup> subfloor adhesive.
  - 2. Adhesive shall have a VOC content of 50 < Insert value> g/L or less.

## PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
  - A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
  - B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
  - C. Securely attach to substrate by fastening as indicated, complying with the following:
    - 1. Chapter 23 in the ICC's International Building Code.
    - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
    - 3. ICC-ES evaluation report for fastener.
  - D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
  - E. Coordinate **[wall]** sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
  - F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

## Church Rock Phase II Factory | Church Rock, NM PRODUCT MASTERSPEC LICENSED BY DELTEK, INC. TO HUBER ENGINEERED WOODS;

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Screw to cold-formed metal framing.
    - b. Space panels 1/8 inch apart at edges and ends.
    - c. Install fasteners 3/8 inchto 1/2 inchfrom panel edges.
    - d. Space fasteners in compliance with requirements of authority having jurisdiction.

END OF SECTION 061600.13

## SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plastic-laminate-faced architectural cabinets.
  - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminatefaced architectural cabinets that are not concealed within other construction.
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
  - 2.
  - 3. Section 12366116 Solid Surfacing Countertops.

#### 1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plastic-laminate-faced architectural cabinets.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show details.
  - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 4. Show locations and sizes of cutouts and holes for items installed in plasticlaminate architectural cabinets.
  - 5. Apply AWI Quality Certification Program label to Shop Drawings.

- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.
- D. Samples for Initial Selection: For each type of exposed finish.
- E. Samples for Verification: For the following:
  - 1. Plastic Laminates: 8 by 10 inches , for each type, color, pattern, and surface finish required.
    - a. Provide one sample applied to core material with specified edge material applied to one edge.
  - 2. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.
- 1.5 INFORMATIONAL SUBMITTALS
  - A. Qualification Data: For Installer .
  - B. Product Certificates: For the following:
    - 1. Composite wood and agrifiber products.
    - 2. Thermoset decorative panels.
    - 3. High-pressure decorative laminate.
    - 4. Adhesives.
  - C. Quality Standard Compliance Certificates: AWI Quality Certification Program .

#### 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.
  - 1. Shop Certification: AWI's Quality Certification Program accredited participant .
- B. Installer Qualifications: AWI's Quality Certification Program accredited participant .
- C. Manufacturer Qualifications: Laminate manufacturer producing products in an ISO 9001 certified facility.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups of typical architectural cabinets as shown on Drawings .
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 17 and 50 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

## 2.1 ARCHITECTURAL CABINET FABRICATORS

- A. Fabricators: Subject to compliance with requirements, fabricators offering architectural cabinets that may be incorporated into the work include, or are equal to, those specified.
  - 1. <Insert, in separate subparagraphs, names and contact information for preapproved woodworking firms>.

### 2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Grade: Custom .
- C. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- E. Type of Construction: Frameless .
- F. Door and Drawer-Front Style: Reveal overlay.
  - 1. Reveal Dimension: 1/2 inch .
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Wilsonart LLC; Decorative Plastic Laminates or a comparable product by one of the following:
    - a. Abet Laminati Inc.
    - b. Formica Corporation.
    - c. Lamin-Art, Inc.
    - d. Pionite; a Panolam Industries International, Inc. brand.
- H. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGL.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS .
  - 4. Edges: ABS/PVC extruded fabrication.
  - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels .
- I. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
  - 2. Drawer Sides and Backs: Thermoset decorative panels with ABS/PVC extrusion edge banding.
  - 3. Drawer Bottoms: Thermoset decorative panels.

- J. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- K. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: NEMA LD 3, Grade VGL thermoset decorative panels .
- L. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners .
- M. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated on Finish Legend in Drawings.

### 2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 4 to 9 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- 2.4 FIRE-RETARDANT-TREATED MATERIALS

### 2.5 CABINET HARDWARE AND ACCESSORIES

- A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening , self-closing.
- B. Back-Mounted Pulls: BHMA A156.9, B02011.
- C. Catches: Magnetic catches, BHMA A156.9, B03141.
- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- E. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
- F. Drawer Slides: BHMA A156.9.
  - 1. Grade 1HD-100 and Grade 1HD-200: Side mounted; [**full**] -extension type; zincplated-steel ball-bearing slides.

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- 2. For drawers not more than 3 inches high and not more than 24 inches wide, provide [**Grade 1**].
- 3. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
- 4. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
- G. Door Locks: BHMA A156.11, E07121.
- H. Drawer Locks: BHMA A156.11, E07041.
- I. Door and Drawer Silencers: BHMA A156.16, L03011.
- J. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, 6 mm thick unless otherwise indicated.
  - 1. Unframed Glass Doors: Seam exposed edges seamed before tempering.
- K. Tempered Float Glass for Cabinet Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 2 or 3 (tinted), Quality-Q3; with exposed edges seamed before tempering, 6 mm thick.
  - 1. Tint Color: Gray .
- L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Stainless Steel: BHMA 630.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kilndried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Adhesive for Bonding Plastic Laminate: Contact cement .
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive.

### 2.7 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. For decorative plastic laminates, comply with manufacturer's written fabrication instructions.
- D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."
  - 1. For glass in frames, secure glass with removable stops.
  - 2. For exposed glass edges, polish and grind smooth.

## PART 3 - EXECUTION

#### 3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

## 3.2 INSTALLATION

- A. Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

- 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
- 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish .

## 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Clean decorative plastic laminate surfaces according to manufacturer's written care and maintenance instructions.
- D. Protect completed work from damage for duration of construction period.

### 3.4 SCHEDULE

END OF SECTION 064116

# SECTION 072100 - THERMAL INSULATION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Mineral-wool blanket.

## 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

## PART 2 - PRODUCTS

## 2.1 MINERAL-WOOL BLANKETS

- A. Mineral-Wool Blanket, Reinforced-Foil Faced : ASTM C665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foilscrim polyethylene.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. Thermafiber, Inc.; an Owens Corning company.

# 2.2 ACCESSORIES

- A. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.2 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
  - 1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.
  - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."
- B. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.
  - 1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.

## 3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

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- 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
  - a. Exterior Walls: Set units with facing placed toward [exterior of construction] interior of construction [as indicated on Drawings].
  - b. Interior Walls: Set units with facing placed [as indicated on Drawings] toward areas of high humidity <Insert location>.

END OF SECTION 072100

### THERMAL INSULATION 072100 - 3

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SECTION 072600 - UNDER-SLAB VAPOR RETARDER

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Products Supplied Under This Section
- B. Vapor Retarder, seam tape, mastic, pipe boots for installation under concrete slabs.

### 1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 Cast-in-place Concrete
- B. Section 03 20 00 Concrete Forming and Accessories
- C. Section 31 23 11 Earthwork for Building Construction

#### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM), latest versions:
  - 1. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials
  - 2. ASTM E154/E154M Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
  - 3. ASTM E1643 Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
  - 4. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI), latest versions:
  - 1. ACI 302.2R Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
- 1.4 SUBMITTALS
  - A. Quality Control / Assurance
    - 1. Comply with Section 01 33 00 Submittal Procedures.
    - Independent laboratory test results showing compliance with ASTM & ACI Standards.
    - 3. Manufacturer's samples, literature
    - 4. Manufacturer's installation instructions for placement, seaming and pipe boot installation
  - B. Delivery, Storage, and Handling

- 1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- 2. Store materials in a clean dry area in accordance with manufacturer's instructions.
- 3. Stack membrane on smooth ground or wood platform to eliminate warping.
- 4. Protect materials during handling and application to prevent damage or contamination.
- 5. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).
- C. Environmental requirements
  - 1. Product not intended for uses subject to abuse or permanent exposure to the elements.
  - 2. Do not apply on frozen ground.

#### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Vapor Retarder (Performance-Based Specifications)
  - 1. Vapor Retarder must have the following qualities at minimum and meet floor finish manufacturer's warranty requirements.
    - a. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A
    - b. Maximum Permeance ASTM E96: 0.01 Perms or as required to meet Flooring Manufacturer's Warranties.
    - c. Tensile Strength ASTM E154, Section 9: not less than 45 LBS. Force/Inch
    - d. Puncture Resistance, ASTM D1709, Method B.
    - e. Thickness of Retarder (plastic) ACI 302.1R: Not less than 15 mils
    - f. Material: Virgin Polyethylene or Polyolefin
  - 2. Vapor Retarder Products, may be by one of the following manufacturers or an approved equal, as long as the requirements above are met.
    - a. Epro, http://eproserv.com
    - b. Fortifiber, http://www.fortifiber.com
    - c. Stego Industries, http://www.stegoindustries.com
    - d. W.R. Meadows, http://www.wrmeadows.com
    - e. Raven Industries, http://www.vaporblock.com
    - f. Reef Industries, http://www.reefindustries.com
    - g. Insulation Solutions, http://www.insulationsolution.com

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### 2.2 ACCESSORIES

- A. Seam Tape
  - 1. Tape must have the following qualities:
    - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

### B. Vapor Proofing Mastic

- 1. Mastic must have the following qualities:
  - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- C. Pipe Boots
  - 1. Construct pipe boots from vapor Retarder material, pressure sensitive tape and/or mastic per manufacturer's instructions.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

A. Examine surfaces to receive membrane. Ensure compaction requirements have been completed and geotechnical firm has confirmed compaction requirements have been met. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

#### 3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturers instructions.

#### 3.3 INSTALLATION

- A. Install Vapor Retarder:
  - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
    - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
    - b. Lap Vapor Retarder over footings and seal to foundation walls.
    - c. Overlap joints 6 inches and seal with manufacturer's tape.
    - d. Seal all penetrations (including pipes) per manufacturer's instructions.
    - e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
    - f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape. UNDER-SLAB VAPOR RETARDER 072600 - 3

END OF SECTION 072600

## SECTION 074213.19 - INSULATED METAL WALL PANELS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Foamed-insulation-core metal wall panels.
  - 2. Laminated-insulation-core metal wall panels.

# 1.2 PREINSTALLATION MEETINGS

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
  - 1. Include fabrication, installation sequence, and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details for weathertight installation.
  - 2. Coordination Drawings: Provide elevation drawings and building sections, which indicate panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
  - 3. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
  - 4. Panel Analysis: Provide panel calculations to verify that panels withstand design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between exterior and interior panel facings and resistance to fastener pullout.
- C. Samples for Initial Selection: For each type of metal panel indicated with factoryapplied color finishes.
  - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
  - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

- 1.4 INFORMATIONAL SUBMITTALS
  - A. Qualification Data: For Installer.
  - B. Product Test Reports: For each product, tests performed by a qualified testing agency.
  - C. Field quality-control reports.
  - D. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
  - A. Qualifications:
    - 1. Manufacturer: 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.
    - 2. Installer: A manufacturer authorized entity that employs experienced installers and supervisors.
  - B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
    - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
    - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

#### 1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

#### 1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: Two <**Insert number**> years from date of Substantial Completion or starting six months from date of shipment and issued to Owner on date of Substantial Completion, whichever occurs first.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No.8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 < Insert number> years from date of Substantial Completion or starting six months from date of shipment and issued to Owner date of Substantial Completion, whichever occurs first.
- C. Thermal Warranty: Standard form in which manufacturer agrees to repair or replace panels that exhibit greater than 10 percent reduction from published material R-value at time of manufacture as measured in accordance with ASTM C518 within specified warranty period.
  - 1. Warranty Period: 30 years from date of Substantial Completion or starting three months from date of shipment and issued to Owner date of Substantial Completion, whichever occurs first.

PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E72 and ASTM E330:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings < Insert loads>.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 <**Insert deflection**> of the span.
  - 4. <Insert serviceability requirements>.
- B. FM Approval 4881: Wall panel windborne debris rating with large missile impact.
  - 1. Non-Tropical Cyclone (NTC) Zone H; Class [+40/-40] [+75/-75].
  - 2. Tropical Cyclone (TC) Zone H; Class +45/-45.
  - 3. Tropical Cyclone Missile (TCM) Zone HM-LM: Class +60/-60.
- C. Freeze/Heat Cycling Test: Panels shall not exhibit delamination, surface blisters, permanent bowing, or deformation when subjected to cyclic temperature extremes of minus 36 to plus 180 deg F for 21, eight-hour cycles.
- D. Air Infiltration: Air leakage of not more than when tested in accordance with ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft. .
- E. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft. .
- F. Water Penetration under Dynamic Pressure: No uncontrolled water penetration through panel assembly when tested in accordance with AAMA 501.1 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 15 lbf/sq. ft..
- G. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion at 140 deg F and 100 percent relative humidity for 1200 hours (50 days).
- H. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of foam core from metal skins at 218 deg F in an autoclave for 150 minutes (2-1/2 hours).
- I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental

effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- 1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces < Insert temperature range>.
- J. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E119.
  - 2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
  - 3. UL 263 Fire-Rated Wall Assembly Fire Test: [1] [2] [3]-hour fire-rated assembly component of UL Design No. U053 [ (rated assemblies include appropriate layers of fire-rated Type X gypsum board)].
  - 4. Potential Heat: Acceptable level when tested in accordance with NFPA 259.
  - 5. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E84.
  - 6. FM Approval 4880: Class I fire rating; panel approved for use without thermal barriers and does not create requirement for automatic sprinkler protection.
  - 7. FM Approval 4882: Class I low smoke rating.
  - 8. Ignition Temperature: Foam core minimum 820 deg F flash temperature and minimum 1050 deg F self-ignition temperature as tested in accordance with ASTM D1929.
  - 9. UL Canada Fire Tests: Pass; fire tests S101, S102, S127, and S134.

# 2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
  - 1. Insulation Core: ASTM C591, Type IV, modified polyisocyanurate foamed-inplace core using a non-CFC, [and ]non-HCFC [, and nonhalogenated (halogenated-flame-retardant-free)] blowing agent, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:
    - a. Closed-Cell Content: 90 percent when tested in accordance with ASTM D6226.
    - b. Density: 2.2 to 2.8 lb/cu. ft. when tested in accordance with ASTM D1622.
    - c. Compressive Strength: Minimum 24 psi when tested in accordance with ASTM D1621.
    - d. Shear Strength: 17 psi when tested in accordance with ASTM C273/C273M.

- e. Tensile Stress: 19 psi in accordance with ASTM D1623.
- f. Oven Aging at 212 deg F: Tested in accordance with ASTM D2126.
  - 1) Volume Change over One Day: Minus 0.63 percent.
  - 2) Volume Change over Seven Days: Plus 0.43 percent.
- g. Low Temperature Aging at minus 40 deg F: Tested in accordance with ASTM D2126.
  - 1) Volume Change over One Day: Plus 0.16 percent.
  - 2) Volume Change over Seven Days: Minus 0.60 percent.
- B. Concealed-Fastener, High-Performance Foamed-Insulation-Core Metal Wall Panels <**Insert drawing designation**>: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan Insulated Panels; KS Azteco KS Micro-Rib or comparable product by one of the following:
    - a. BENCHMARK by Kingspan.
    - b. Green Span Profiles.
    - c. FALK Panel.
    - d. <Insert manufacturer's name>.
  - 2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Nominal Thickness: 0.022 inch , 26 gauge .
    - b. Exterior Finish: Mica fluoropolymer .
      - 1) Profile: Flat Micro-Rib .
      - 2) Embossing: Azteco .
      - Color: As selected by Architect from manufacturer's full range < Insert color>.
  - 3. Panel Coverage: As indicated on drawings nominal.
  - 4. Panel Thickness: 4.0 inches .
  - 5. Thermal-Resistance Value (R-Value): 8.0 deg F x h x sq. ft./Btu per inch at 75 deg F mean temperature and 9.0 deg F x h x sq. ft./Btu per inch at 35 deg F mean temperature in accordance with ASTM C518.
- C. Basis of Design Intergrated Window System:
  - 1. 1. Kingspan Light + Air | CPI Daylighting UniQuad Window System

## 2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metalliccoated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefinfoam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Backer Board: Hardboard complying with ANSI A135.4, Class 1 tempered, [1/8 inch] [1/4 inch] thick unless otherwise indicated.
- D. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 TRANSLUCENT WINDOW PERFORMANCE AND APPEARANCE

- A. Glazing unit construction for longevity and resistance to buckling and pressure
  - 1. Translucent glazing must be constructed of tight cell sizes not exceeding 0.18". Wide cells of size greater than 0.18" shall not be acceptable.
- B. Translucent glazing assemblies Unitized Double Glazed

- 1. Design, engineer, manufacture, and installation of unitized double-glazed translucent Window system. An assembly of two independent insulated glazing units in one integrated assembly, incorporated into a complete aluminum frame system that has been tested and warranted by the manufacturer as a single source system. Design shall provide for the replacement of the exterior glazing, independently of the interior glazing without exposing the building's interior or compromising the weather tightness of interfering with the normal working functions of the building. The interior glazing remains intact for the life of the building envelope. Single glazed systems will not meet these requirements and are not acceptable.
- 2. Overall glazing assembly thickness shall be a minimum 2.75", with two glazing units and concealed interlocking connector. Minimum thickness of the exterior and interior glazing units shall be 10mm thick each.
- 3. Each individual sheet of glazing shall be captured by aluminum structure on all sides and all loading applied to the glazing must be immediately supported by the systems aluminum structure. Glazing shall not provide its own load resistance
- C. Thermal and Solar Performance
  - 1. Insulation U-Value performance per NFRC 100 and 700 is required by the IBC/IECC/ASHRE/COMcheck energy code. Such performance values must be certified and labeled by the NFRC.
  - 2. Center of glazing U-Value certified and labeled per NFRC 100: Maximum .23. [Optional augmentations to: .07]
  - 3. System U-Value per NFRC 100 and 700: Maximum .29. [Optional augmentations to: .11]
  - 4. Visible Light Transmission Center of Glass (VT%) \_\_\_\_\_ Per ASTM E-972 and E-1084.
  - 5. Solar Heat Gain Coefficient (SHGC) \_\_\_\_\_ per NFRC Calorimeter.
  - 6. Haze measurement minimum of 90% per ASTM D-1003.
  - 7. Standard Color: \_\_\_\_\_.
- D. Translucent Glazing and Insulated Metal Panels Integration
  - 1. Water penetration: no water penetration of the glazing joint connection length at test pressure of 6.24 PSF per ASTM E-331
  - 2. Air Infiltration: pass requirements of NFRC 400 at 1.57 PSF and 6.24 PSF
  - 3. Free movement of the glazing shall be allowed to occur without damage to the weather tightness of the completed system
  - The glazing joint connection shall complete with the deflection limitation of IBC Table 1604.3 for exterior walls with flexible finishes – SPAN/120 per ASTM E-330.
- E. Flammability
  - 1. Exterior Glazing
    - a. Class CC1 fire rating classification per ASTM D-635.
    - b. Class A interior flame spread:
    - c. Flame spread no greater than zero (0) per ASTM E-84.
    - d. Smoke density no greater than 75 per ASTM D-2843.
    - e. Minimum self ignition temperature of 1120° per ASTM 1929.

- 2. Interior Glazing
  - a. Class CC1 fire rating classification per ASTM D-635.
  - b. Class A interior flame spread:
  - c. Flame spread no greater than zero (0) per ASTM E-84.
  - d. Smoke density no greater than 75 per ASTM D-2843.
  - e. Minimum self-ignition temperature of 1120° per ASTM 1929.

## F. Impact Resistance

- 1. Minimum Impact resistance of 350 ft. lbs. per SFBC PA 201-94.
  - a. Minimum Impact loading of 500 ft. lbs. per ASTM E-695.
  - b. Must comply with standard specification for performance of exterior windows or curtain walls when impacted by windborne debris at level D and after cyclic wind loading at the specified design load (ASTM E1996-02)
- G. Weatherability
  - 1. The light transmission shall not decrease more than 6% as measured by ASTM D-1003 over 10 years, or after exposure to temperature of 300° for 25 minutes (thermal aging performance standard).
  - 2. The weathering performance should be justified by successful testing of the glazing's performance after exposure to actual Florida weather conditions for approximately 10 years in comparison to a new glazing assembly. This performance must be demonstrated by providing independent lab test reports for the exposed and a new panel assembly for the following tests; test results must show that there is no deterioration in performance for the 10 year's exposed panels versus new:
    - a. Uniform static air pressure per ASTM E-330 at negative load of -105 PSF and positive load of 130 PSF.
    - b. Impact loading of 500 ft.lbs. per ASTM E-695.
    - c. Cyclic static air pressure at 65 PSF and impact lever D per ASTM 1886 and ASTM E-1996
  - 3. Glazing must be manufactured with a permanent, co-extruded ultra-violet protective layer. Post-applied coatings or films of dissimilar materials that need to be maintained are unacceptable.
  - 4. Glazing shall not become readily detached when exposed to temperatures of 300°F and 0°F for 25 minutes.
  - 5. Thermal aging the interior and exterior glazing shall not change color in excess of 0.75 Delta E per ASTM D-2244 and shall not darken more than 0.3 units Delta L per ASTM D-2244 and shall allow no cracking or crazing when exposed to 300°F for 25 minutes.
  - 6. Glazing shall be factory sealed to restrict dirt ingress.

## H. METAL FRAME STRUCTURE

- 1. Design criteria shall be:
  - a. Negative design wind load \_\_\_\_\_ PSF.
  - b. Positive design wind load \_\_\_\_\_ PSF.
- 2. The wall light framing is designed to be self-supporting between the support constructions. The deflection of the system framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection,

shall not exceed L/120 for the unsupported span per IBC 2018 Table 1604.3. The curtain wall system will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads included horizontal and vertical, exerted by the system. Design or structural engineering services for the supporting structure or building components in not included in the curtain wall scope of this section:

- 3. Water penetration: the curtain wall system shall allow no water penetration at a minimum differential static pressure of 6.24 PSF per AAMA 501 pressure difference recommendations and as demonstrated by prior testing of typical framing sample per ASTM E-331
- 4. Water test of meal frame structure shall be conducted according to procedures in AAMA 501.2.
- 5. Maximum air infiltration rate for fenestration of the two glazing assemblies of curtain wall system shall be per NFRC 400.
- I. METAL MATERIALS
  - 1. Extruded aluminum shall be ANSI/ASTM B-221; 6063-T6 or 6005-T5.
  - 2. Flashing:
    - a. 5005 H34 Aluminum
    - b. Sheet metal flashings/claddings are to be furnished shop formed to profile when lengths exceed 10ft, provide in nominal 10ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6in to 8in, set in a full bed of sealant and riveted if required.
  - 3. All fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.
  - 4. All exposed ALUMINUM FINISH shall be from manufacturer standard color range: [Black Anodize]

## 2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

- 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
- 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
- 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
  - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
  - 1. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or lightcolored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

- 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
- 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
  - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written recommendations.

## 3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving metal panels.
  - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  - 3. Install screw fasteners in predrilled holes.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Install flashing and trim as metal panel work proceeds.
  - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
  - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

- 2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.
  - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

## 3.4 INSULATED METAL WALL PANEL INSTALLATION

- A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
  - 1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
  - 2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
  - 3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
  - 4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  - 5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
  - 6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
- B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
  - 1. Install clips to supports with self-tapping fasteners.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

- 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.
  - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

## 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect <**Insert area**> for water penetration in accordance with AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Metal wall panels will be considered defective if they do not pass test and inspections.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

### 3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.19

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## SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal soffit panels.
- B. Related Sections:
  - 1. Section 074113.13 "Formed Metal Roof Panels" for lap-seam metal roof panels.
  - 2. Section 074213.13 "Formed Metal Wall Panels" for lap-seam metal wall panels.

### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] < Insert location>.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
  - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  - 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factoryapplied color finishes.
  - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

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- 1.4 INFORMATIONAL SUBMITTALS
  - A. Qualification Data: For Installer.
  - B. Product Test Reports: For each product, tests performed by a qualified testing agency.
  - C. Sample Warranties: For special warranties.

### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
  - 1. Build mockup of typical roof eave [, including fascia,] and soffit as indicated on Drawings; approximately [four panels wide] <Insert size> by full eave width, including attachments and accessories.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

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- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

### 1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

#### 1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: [Two] <Insert number> years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 < Insert number> years from date of Substantial Completion.
PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Deflection Limits: For wind loads, no greater than [1/180] < Insert deflection > of the span.
  - 3. <Insert serviceability requirements>.
- B. Air Infiltration: Air leakage of not more than [**0.06 cfm/sq. ft.**] <**Insert rate**> when tested in accordance with ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: [1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.].
- C. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: [2.86 lbf/sq. ft.] [6.24 lbf/sq. ft.].
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): [120 deg F , ambient; 180 deg F , material surfaces] <Insert temperature range>.

#### 2.2 METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal wall panels.
  - 1. Finish: Match finish and color of metal wall panels .
  - 2. Sealant: Factory applied within interlocking joint.
- C. Flush-Profile Metal Soffit Panels <**Insert drawing designation**> : Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.

# Church Rock Phase II Factory | Church Rock, NM

#### PRODUCT MASTERSPEC LICENSED BY DELTEK, INC. TO PAC-CLAD; PETERSEN ALUMINUM CORPORATION

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide PAC-CLAD | Petersen Aluminum; Pac-Clad Flush Soffit Panels or comparable product by one of the following:
  - a. AEP Span; A BlueScope Steel Company.
  - b. Architectural Building Components.
  - c. ATAS International, Inc.
  - d. CENTRIA Architectural Systems.
  - e. Dimensional Metals, Inc.
  - f. Drexel Metals.
  - g. Englert, Inc.
  - h. Fabral.
  - i. Firestone Building Products.
  - j. Innovative Metals Company, Inc.
  - k. MBCI.
  - I. McElroy Metal, Inc.
  - m. Merchant and Evans.
  - n. Metal Sales Manufacturing Corporation.
  - o. PAC-CLAD; Petersen Aluminum Corporation.
  - p. Ultra Seam Incorporated.

# q. <Insert manufacturer's name>.

- 2. Material: Same material, finish, and color as metal roof panels.
- 3. Panel Coverage: 12 inches <**Insert dimension**>.
- 4. Panel Height: [1.0 inch] < Insert dimension>.

# 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metalliccoated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefinfoam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

# 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate in accordance with equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

- 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
  - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

# 2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
  - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [ for seacoast and severe environments].

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
  - 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
  - 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
    - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written recommendations.
  - 1. Soffit Framing: Wire tie [ or clip] furring channels to supports [, as required to comply with requirements for assemblies indicated].

# 3.3 INSTALLATION

- A. Install metal panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving metal panels.
  - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  - 3. Install screw fasteners in predrilled holes.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Install flashing and trim as metal panel work proceeds.
  - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
  - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
  - 2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
  - 3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
  - 4. Stainless Steel Panels: Use stainless steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

- 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
- 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Watertight Installation:
  - 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
  - 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
  - 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
  - 1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

# 3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

# SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Adhered thermoplastic polyolefin (TPO) roofing system.
  - 2. Substrate board.
  - 3. Roof insulation.
  - 4. Cover board.
  - 5. Walkways.

# 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
  - 1. Layout and thickness of insulation.
  - 2. Base flashings and membrane termination details.
  - 3. Flashing details at penetrations.
  - 4. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
  - 5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
  - 6. Tie-in with adjoining air barrier.
- C. Samples: For the following products:
  - 1. Roof membrane and flashings, of color required.
  - 2. Walkway pads or rolls, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates:
  - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
    - a. Submit evidence of compliance with performance requirements.
  - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- B. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- C. Sample warranties.

# 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: [**30**] years from date of Substantial Completion.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING 075423 - 2

- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
  - 1. Zone 1 (Roof Area Field): < Insert lbf/sq. ft.>.
  - 2. Zone 2 (Roof Area Perimeter): < Insert lbf/sq. ft.>.
    - a. Location: From roof edge to <**Insert dimension**> inside roof edge.
  - 3. Zone 3 (Roof Area Corners): <Insert lbf/sq. ft.>.
    - a. Location: **<Insert dimension>** in each direction from building corner.
- D. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.

# 2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, TPO sheet.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. Carlisle SynTec Incorporated.
    - b. Firestone Building Products.
    - c. Johns Manville; a Berkshire Hathaway company.
  - 2. Thickness: 80 mils , nominal.
  - 3. Exposed Face Color: [White] .

# 2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
  - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 80 mils thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

# 2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. Georgia-Pacific Gypsum LLC.
    - b. National Gypsum Company.

#### THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING 075423 - 3

- c. USG Corporation.
- 2. Thickness: [1/2 inch] thick.
- 3. Surface Finish: Unprimed.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

# 2.5 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. Carlisle SynTec Incorporated.
    - b. Firestone Building Products.
    - c. Johns Manville; a Berkshire Hathaway company.
  - 2. Size: 48 by 48 inches .
  - 3. Thickness:
    - a. Base Layer: 1-1/2 inches .
    - b. Upper Layer: 4 inches .

# 2.6 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- B. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Georgia-Pacific Gypsum LLC.
    - b. National Gypsum Company.
    - c. USG Corporation.
  - 2. Thickness: 1/2 inch 5/8 inch.
  - 3. Surface Finish: Unprimed.

#### 2.7 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surfacetextured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
  - 1. Size: Approximately 36 by 60 inches.
  - 2. Color: Contrasting with roof membrane.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

#### 3.2 PREPARATION

- A. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
  - 1. Submit test result within 24 hours after performing tests.
    - Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

#### 3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

# 3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
  - 1. At steel roof decks, install substrate board at right angle to flutes of deck.
    - a. Locate end joints over crests of steel roof deck.
  - 2. Tightly butt substrate boards together.
  - 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - 4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.

# 3.5 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
  - 1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows .
    - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
      - 1) Trim insulation so that water flow is unrestricted.
    - e. Fill gaps exceeding 1/4 inch with insulation.
    - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    - g. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
      - 1) Fasten insulation according to requirements in [FM Approvals' RoofNav for specified Windstorm Resistance Classification].
      - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
  - 2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
    - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
      - 1) Trim insulation so that water flow is unrestricted.
    - e. Fill gaps exceeding 1/4 inch with insulation.
    - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    - g. Adhere each layer of insulation to substrate using adhesive according to [FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification] and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

# 3.6 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
  - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - 2. At internal roof drains, conform to slope of drain sump.
    - a. Trim cover board so that water flow is unrestricted.
  - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
  - Adhere cover board to substrate using adhesive according to [FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification] and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    - a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

# 3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
  - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
  - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

# 3.8 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

# 3.9 INSTALLATION OF WALKWAYS

- A. Flexible Walkways:
  - 1. Install flexible walkways at the following locations:
    - a. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
    - b. Locations indicated on Drawings.
    - c. As required by roof membrane manufacturer's warranty requirements.
  - 2. Provide 6-inch clearance between adjoining pads.
  - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

#### 3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075423

# THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING 075423 - 9

# SECTION 076200 - SHEET METAL FLASHING AND TRIM

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Manufactured reglets with counterflashing.
  - 2. Formed roof-drainage sheet metal fabrications.
  - 3. Formed low-slope roof sheet metal fabrications.
  - 4. Formed wall sheet metal fabrications.

# 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site < Insert location>.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each of the following
    - 1. Underlayment materials.
    - 2. Elastomeric sealant.
    - 3. Butyl sealant.
    - 4. Epoxy seam sealer.
  - B. Shop Drawings: For sheet metal flashing and trim.
    - 1. Include plans, elevations, sections, and attachment details.
    - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
    - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
    - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
    - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
    - 6. Include details of termination points and assemblies.
    - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
    - 8. Include details of roof-penetration flashing.
    - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
    - 10. Include details of special conditions.
    - 11. Include details of connections to adjoining work.
  - C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

# SHEET METAL FLASHING AND TRIM

# 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.
- B. Sample warranty.

# 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Special warranty.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
  - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

#### 1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No.8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 < Insert number> years from date of Substantial Completion.

# PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

#### SHEET METAL FLASHING AND TRIM 076200 - 2

- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
  - 1. Design Pressure: As indicated on Drawings < Insert design pressure >.
- D. FM Approvals Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90 <**Insert class**>. Identify materials with name of fabricator and design approved by FM Approvals.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces <**Insert temperature change**>.

# 2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
  - 1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  - 2. Color: As selected by Architect from manufacturer's full range < Insert color>.
  - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304 , dead soft, fully annealed; with smooth, flat surface.
  - 1. Finish: ASTM A480/A480M, No. 2B (bright, cold rolled).
- D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 coating designation [or] aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A755/A755M.

- 1. Surface: Smooth, flat and mill phosphatized for field painting .
- 2. Exposed Coil-Coated Finish:
  - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 3. Color: As selected by Architect from manufacturer's full range < Insert color>.
- 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

# 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Henry Company.
    - b. Owens Corning.
  - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners , solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

#### SHEET METAL FLASHING AND TRIM 076200 - 4

- 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Solder:
  - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
  - 2. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Material: Galvanized steel, 0.022 inch thick.
  - 2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 3. Accessories:
    - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
  - 4. Finish: With manufacturer's standard color coating **<Insert finish>**.

# SHEET METAL FLASHING AND TRIM 076200 - 5

# 2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
  - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
  - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- F. Seams:
  - 1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

# 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters:
  - 1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
  - 2. Fabricate in minimum 96-inch- long sections.
  - 3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet

SHEET METAL FLASHING AND TRIM 076200 - 6 metal standard, but with thickness not less than twice the gutter thickness <**Insert dimension**>.

- 4. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
- 5. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen Wire-ball downspout strainer Valley baffles.
- 6. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
  - a. Galvanized Steel: [0.022 inch] < Insert dimension> thick.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors <Insert material> . [Shop fabricate elbows.]
  - 1. Fabricate from the following materials:
    - a. Galvanized Steel: [0.022 inch] < Insert dimension> thick.

# 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
  - 1. Fabricate from the following materials:
    - a. Galvanized Steel: [0.040 inch] < Insert dimension> thick.
- B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  - 1. Galvanized Steel: [0.028 inch] < Insert dimension> thick.
- C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  - 1. Galvanized Steel: [0.022 inch] < Insert dimension> thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: [0.028 inch] < Insert dimension> thick.

#### 2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:
  - 1. Stainless Steel: [0.0156 inch] < Insert dimension> thick.

#### SHEET METAL FLASHING AND TRIM 076200 - 7

- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches <**Insert dimension**> beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
  - 1. Aluminum: [0.032 inch] <Insert dimension> thick.
  - 2. Galvanized Steel: [0.022 inch] < Insert dimension> thick.
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
  - 1. Aluminum: [0.040 inch] <Insert dimension> thick.
  - 2. Galvanized Steel: [0.028 inch] < Insert dimension> thick.

# PART 3 - EXECUTION

# 3.1 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
  - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
  - 2. Prime substrate if recommended by underlayment manufacturer.
  - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
  - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
  - 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
  - 6. Roll laps and edges with roller.
  - 7. Cover underlayment within 14 days.

## 3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
  - 1. Install fasteners , solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder welds sealant.
  - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
  - 6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  - 7. Do not field cut sheet metal flashing and trim by torch.

#### SHEET METAL FLASHING AND TRIM 076200 - 8

- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
  - 1. Space movement joints at maximum of 10 feet <**Insert dimension**> with no joints within 24 inches of corner or intersection.
  - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  - 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance **<Insert size** requirement>.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
  - 1. Use sealant-filled joints unless otherwise indicated.
    - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
    - b. Form joints to completely conceal sealant.
    - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
    - d. Adjust setting proportionately for installation at higher ambient temperatures.
      - 1) Do not install sealant-type joints at temperatures below 40 deg F.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
  - 1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
  - 2. Do not solder metallic-coated steel and aluminum sheet.
  - 3. Do not pretin zinc-tin alloy-coated copper.
  - 4. Do not use torches for soldering.
  - 5. Heat surfaces to receive solder, and flow solder into joint.
    - a. Fill joint completely.
    - b. Completely remove flux and spatter from exposed surfaces.

#### SHEET METAL FLASHING AND TRIM 076200 - 9

- 6. Stainless Steel Soldering:
  - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
  - b. Promptly remove acid-flux residue from metal after tinning and soldering.
  - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

# 3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
  - 1. Join sections with riveted and soldered joints [or] [joints sealed with sealant].
  - 2. Provide for thermal expansion.
  - 3. Attach gutters at eave or fascia to firmly anchor them in position.
  - 4. Provide end closures and seal watertight with sealant.
  - 5. Slope to downspouts.
  - 6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, **[50 feet]** <**Insert dimension**> apart. Install expansion-joint caps.
  - 7. Install continuous gutter screens on gutters with noncorrosive fasteners, [removable] [hinged to swing open] for cleaning gutters.
- C. Downspouts:
  - 1. Join sections with 1-1/2-inch telescoping joints.
  - 2. Provide hangers with fasteners designed to hold downspouts securely to walls.
  - 3. Locate hangers at top and bottom and at approximately 60 inches o.c.
  - 4. Provide elbows at base of downspout to direct water away from building.
  - 5. Connect downspouts to underground drainage system.
- D. Parapet Scuppers:
  - 1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
  - 2. Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
  - 3. Loosely lock front edge of scupper with conductor head.
  - 4. Solder or seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- E. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper [**or**] [**gutter**] discharge.
- F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

# SHEET METAL FLASHING AND TRIM 076200 - 10

# 3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
  - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Copings:
  - 1. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
  - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  - 2. Extend counterflashing 4 inches over base flashing.
  - 3. Lap counterflashing joints minimum of 4 inches.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

#### 3.5 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches <**Insert dimension**> beyond wall openings.

# 3.6 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

# 3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

# 3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

# SECTION 077100 - ROOF SPECIALTIES

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Copings.
  - 2. Reglets and counterflashings.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Samples: For each type of roof specialty and for each color and texture specified.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Sample warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For roofing specialties to include in maintenance manuals.
- 1.5 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are [FM Approvals listed for specified class] [and] [SPRI ES-1 tested to specified design pressure].

# 1.6 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075400 " Thermoplastic Polyolefin (TPO) Membrane Roofing ."
- B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.

- b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install copings roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-75. Identify materials with FM Approvals' markings.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces.

# 2.2 COPINGS

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. Architectural Products Company.
    - b. ATAS International, Inc.
    - c. Berridge Manufacturing Company.
    - d. Metal-Era, Inc.
    - e. PAC-CLAD; Petersen Aluminum Corporation.
  - 2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, thickness as required to meet performance requirements .
    - a. Surface: Smooth, flat finish.
    - b. Finish: Two-coat fluoropolymer .
    - c. Color: As selected by Architect from manufacturer's full range .
  - 3. Corners: Factory mitered and continuously welded .
  - 4. Coping-Cap Attachment Method: Snap-on or , fabricated from coping-cap material.
    - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

# 2.3 REGLETS AND COUNTERFLASHINGS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
  - 1. Berridge Manufacturing Company.
  - 2. Keystone Flashing Company, Inc.
  - 3. Metal-Era, Inc.
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
  - 1. Formed Aluminum: **[0.050 inch]** thick.
  - 2. Corners: Factory mitered and soldered .
  - 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
  - 1. Formed Aluminum: 0.024 inch thick.
- D. Accessories:
  - 1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
  - 2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
- E. Aluminum Finish: Clear anodic .

#### 2.4 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

#### 2.5 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.

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- b. Henry Company.
- c. Owens Corning.
- 2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F.
- 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F.

# 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
  - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
  - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
- B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- 2.7 FINISHES
  - A. Coil-Coated Aluminum Sheet Finishes:
    - 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      - Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6

#### ROOF SPECIALTIES 077100 - 4

inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

# 3.2 INSTALLATION, GENERAL

- A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
  - 1. Install roof specialties level, plumb, true to line and elevation; with limited oilcanning and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
  - 4. Torch cutting of roof specialties is not permitted.
  - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of [**uncoated aluminum**] roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
  - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
  - 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .
- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pretinning where pre-tinned surface would show in completed Work. Tin edges of

# ROOF SPECIALTIES 077100 - 5

uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

# 3.3 INSTALLATION OF COPING

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
  - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements .

# 3.4 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

- A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

# 3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

# SECTION 077129 - MANUFACTURED ROOF EXPANSION JOINTS

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Aluminum roof expansion joints.

# 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] < Insert location>.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roof expansion joints.
- C. Samples: For each exposed product and for each color specified.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification data.
- B. Product test reports.
- C. Sample warranty.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: Installer of roofing membrane.
- 1.6 WARRANTY
  - A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.
    - 1. Warranty Period: [Two] <Insert number> years from date of Substantial Completion.

# PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Rating: Comply with ASTM E1966 or UL 2079; testing by a qualified testing agency to resist the spread of fire and to accommodate building thermal movements without impairing its ability to resist the passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.
  - 1. Rating: Not less than 1-hour < Insert rating>.
  - 2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

# 2.2 ALUMINUM ROOF EXPANSION JOINTS

- A. Aluminum Roof Expansion Joint: Factory-fabricated, continuous, waterproof joint cover; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. Nystrom, Inc.
    - e. Watson Bowman Acme Corp.
  - 2. Cover: Formed or extruded aluminum Stainless steel ; thickness [as recommended by manufacturer] <Insert thickness>.
  - 3. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
  - 4. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
  - 5. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the cover.
    - a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to exterior-wall expansion joint cover <**Insert** requirement>.
    - b. Thermal Insulation: Fill space above secondary seal with [mineral-fiber blanket] <Insert requirement> insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.
  - 6. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.
- B. Materials:
- 1. Aluminum: ASTM B209 for sheet and plate, ASTM B221 for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
  - a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
  - b. Mill Finish: As manufactured.
  - c. Aluminum Finish Color: As selected by Architect from manufacturer's full range <**Insert requirement**>.
- 2. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304; finish ASTM A480/A480M No. 2B.

# 2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: As recommended by roof-expansion-joint manufacturer.
  - 1. <a></a>
    Click to insert sustainable design text for VOC content of adhesive.>
  - 2. <a><br/>
    </a> 

    2. 

    <</td>

    Click to insert sustainable design text for low emitting adhesives.>
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
  - 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- C. Mineral-Fiber Blanket: ASTM C665.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for handling and installing roof expansion joints.
  - 1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
  - 2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 3. Provide for linear thermal expansion of roof-expansion-joint materials.
- B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.
- C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079513.16 "Exterior Expansion Joint Cover Assemblies" to result in watertight

#### MANUFACTURED ROOF EXPANSION JOINTS 077129 - 3

performance. [Install factory-fabricated units at transitions between roof expansion joints and exterior expansion-control joint systems.]

- D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.
  - 1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.
- E. Fire Barrier: Install fire barrier as required by manufacturer to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.
- F. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION 077129

# SECTION 077200 - ROOF ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Roof curbs.
  - 2. Roof hatches.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of roof accessory.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Sample warranties.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Operation and maintenance data.

#### 1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. AES Industries, Inc.
- b. Curbs Plus, Inc.
- c. Kingspan Light + Air, North America.
- d. LMCurbs.
- e. Roof Curb Systems.
- f. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.
- g. Thybar Corporation.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.
  - 1. Finish: Factory prime coating .
  - 2. Color: As selected by Architect from manufacturer's full range .
- D. Construction:
  - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
  - 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
  - 3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
  - 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deckmounting flange .
  - 5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
  - 6. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
  - 7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
  - 8. Nailer: Factory-installed wood nailer along top flange of curb , continuous around curb perimeter.

## 2.2 ROOF HATCHES

- A. Roof Hatches: Metal roof-hatch units with lids and insulated single -walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Babcock-Davis.
    - b. Dur-Red Products.
    - c. Kingspan Light + Air LLC.
    - d. Nystrom, Inc.
    - e. O'Keeffe's Inc.
    - f. Precision Ladders, LLC.

#### ROOF ACCESSORIES 077200 - 2

- 2. Type and Size: Single-leaf lid, 30 by 54 inches < Insert dimensions>.
- Loads: Minimum [40-lbf/sq. ft.] <Insert value> external live load and [30-lbf/sq. ft.] <Insert value> internal uplift load.
  - a. When release is actuated, lid shall open against [**10-lbf/sq. ft.**] <**Insert** value> snow or wind load and lock in position.
- 4. Curb, Framing, and Lid Material: Aluminum-zinc alloy-coated steel sheet.
  - a. Thickness: Manufacturer's standard thickness for hatch size indicated <**Insert dimension**>.
  - b. Finish: Two-coat fluoropolymer < Insert finish>.
  - c. Color: As selected by Architect from manufacturer's full range < Insert color>.
- 5. Construction:
  - a. Insulation: 2-inch- thick, polyisocyanurate board.
    - 1) R-Value: 12.0 < Insert R-value > according to ASTM C1363.
  - b. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
  - c. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  - d. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
  - e. Fabricate curbs to minimum height of [**12 inches**] <**Insert dimension**> above roofing surface unless otherwise indicated.
  - f. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
  - g. Security Grille: Provide for all units .
- 6. Hardware: Manufacturer's standard corrosion resistant ; with hinges, hold-open devices, and independent manual-release devices for inside and outside operation of lids.

# 2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation and mill phosphatized for field painting where indicated.
  - 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 coated.
  - 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- C. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

- 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- D. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- E. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.
- F. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.
- G. Steel Tube: ASTM A500/A500M, round tube.
- H. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.
- I. Steel Pipe: ASTM A53/A53M, galvanized.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Acrylic Glazing: ASTM D4802, thermoformable, monolithic sheet, manufacturer's standard, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).
- C. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated according to UL 972 with an average impact strength of 12 to 16 ft-lbf/in. of width when tested according to ASTM D256, Method A (Izod).
- D. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.
- E. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.
- F. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- G. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.
- H. Underlayment:
  - 1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
  - 2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D4397.

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- 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
- I. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
- J. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- K. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- L. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- M. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
  - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
- C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

#### 3.2 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200



# SECTION 078413 - PENETRATION FIRESTOPPING

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.
- 1.2 PREINSTALLATION MEETINGS
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
    - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Product test reports.

### 1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

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### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."

### 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. 3M Fire Protection Products.
    - b. Hilti, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

- 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### 3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

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- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or selfadhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning Penetration Firestopping Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

# SECTION 078443 - JOINT FIRESTOPPING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Joints in or between fire-resistance-rated constructions.
  - 2. Joints in smoke barriers.
- 1.2 PREINSTALLATION MEETINGS

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Product test reports.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.
- PART 2 PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."

#### JOINT FIRESTOPPING 078443 - 1

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## 2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. 3M Fire Protection Products.
    - b. Hilti, Inc.
  - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- D. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

- D. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
  - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning Joint Firestopping Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

#### 3.3 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078443

JOINT FIRESTOPPING 078443 - 3

# SECTION 079100 - PREFORMED JOINT SEALS

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Section includes preformed, foam joint seals.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each preformed joint seal product.
- B. Samples for Verification: For each type and color of preformed joint seal required.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

### 1.4 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace preformed joint seals that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: [**Two**] <**Insert number**> years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals 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: [Five] <Insert number> years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals <Insert drawing designation>: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths

## PREFORMED JOINT SEALS 079100 - 1

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based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. EMSEAL Joint Systems, Ltd.
  - b. LymTal International, Inc.
  - c. MM Systems Corporation.
  - d. Nystrom, Inc.
  - e. Pecora Corporation.
  - f. Willseal; Tremco Construction Products Group.
- 2. Design Criteria:
  - a. Nominal Joint Width: [As indicated on Drawings] < Insert dimension>.
  - b. Movement Capability: [As indicated on Drawings] [-25 percent/+25 percent] <Insert percentage>.
- 3. Joint Seal Color: As selected by Architect from full range of industry colors .

# PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:
  - 1. Remove laitance and form-release agents from concrete.
  - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces.

### 3.2 INSTALLATION

- A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Installation of Preformed, Foam Joint Seals:
  - 1. Install each length of seal immediately after removing protective wrapping.

- 2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
- 3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
- 4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

END OF SECTION 079100

### PREFORMED JOINT SEALS 079100 - 3

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# SECTION 079200 - JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Silicone joint sealants.
  - 2. Urethane joint sealants.
- 1.2 PREINSTALLATION MEETINGS

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. 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.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field-adhesion-test reports.
- C. Sample warranties.

#### 1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

### 1.6 PRECONSTRUCTION TESTING

#### 1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: [Two] <Insert number> years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: [Five] <Insert number> years from date of Substantial Completion.

#### PART 2 - PRODUCTS

- 2.1 JOINT SEALANTS, GENERAL
  - A. Colors of Exposed Joint Sealants: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- 2.2 SILICONE JOINT SEALANTS
  - A. Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.
    - 1. <a><br/>
      </a>

      <</td>

      <

## 2.3 URETHANE JOINT SEALANTS

- A. Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T and NT.
  - 1. <a><br/>
    </a>
    </a>

### 2.4 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, [Type C (closed-cell material with a surface skin)] [Type O (open-cell material)] [Type B (bicellular material with a

## JOINT SEALANTS 079200 - 2

surface skin)] [or any of the preceding types, as approved in writing by jointsealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- 1. <Click here to find, evaluate, and insert list of manufacturers and products.>
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

### 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.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove laitance and form-release agents from concrete.
  - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

### 3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

### JOINT SEALANTS 079200 - 3

- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

## 3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform [10] <Insert number> tests for the first [1000 feet] <Insert dimension> of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each [**1000 feet**] <**Insert dimension**> of joint length thereafter or one test per each floor per elevation.
  - 2. 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.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

## 3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces [ **<JS-#>**].
  - 1. Joint Locations:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
  - 2. Joint Sealant: Urethane, M, P, 50, T, NT < Insert joint sealant>.
  - 3. Joint-Sealant Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range of colors] <Insert color>.

#### JOINT SEALANTS 079200 - 4

- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces [ **<JS-#**>].
  - 1. Joint Locations:

a. Construction joints in cast-in-place concrete.

b.

- 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT < Insert joint sealant>.
- 3. Joint-Sealant Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range of colors] <Insert color>.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces [ **<JS-#>**].
  - 1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.

b.

- 2. Joint Sealant: Urethane, S, P, 25, T, NT < Insert joint sealant>.
- 3. Joint-Sealant Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range of colors] <Insert color>.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement [ <JS-#>].
  - 1. Joint Locations:
    - a. Perimeter joints between interior wall surfaces and frames of [interior doors] [windows] [and] [elevator entrances].
    - b.
  - 2. Joint Sealant: <**Insert joint sealant**>.
  - 3. Joint-Sealant Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range of colors] <Insert color>.

END OF SECTION 079200

JOINT SEALANTS

SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

# PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes interior expansion joint cover assemblies.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each expansion joint cover assembly.
  - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams [and a tabular schedule of expansion joint cover assemblies].
- C. Samples: For each expansion joint cover assembly and for each color and texture specified.

## PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to [UL 2079] [or] [ASTM E1966] by a qualified testing agency.
  - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies to be subjected to hose stream testing.
- B. Expansion Joint Design Criteria < Insert drawing designation >:
  - 1. Type of Movement: [Thermal] [Wind sway].
    - a. Nominal Joint Width: [As indicated on Drawings] < Insert width>.
    - b. Minimum Joint Width: [As indicated on Drawings] <Insert width>.

- c. Maximum Joint Width: [As indicated on Drawings] <Insert width>.
- 2. Seismic Movement:
  - a. Joint Movement: As indicated on Drawings.

# 2.3 FLOOR EXPANSION JOINT COVERS

- A. Metal-Plate Floor Joint Cover <**Insert drawing designation**>: Metal cover plate fixed on one side of joint gap and free to slide on other.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. Nystrom, Inc.
    - e. Watson Bowman Acme Corp.
  - 2. Application: Floor to floor Floor to wall.
  - 3. Installation: Surface mounted.
  - 4. Load Capacity:
    - a. Uniform Load: [50 lb/sq. ft.] <Insert load>.
    - b. Concentrated Load: [300 lb] < Insert load>.
    - c. Maximum Deflection: [0.0625 inch] <Insert deflection>.
  - 5. Fire-Resistance Rating: Not less than [that of adjacent construction] <Insert rating>.
  - 6. Cover-Plate Design: [Plain] .
  - 7. Exposed Metal:
    - a. Aluminum: Mill Manufacturer's standard .
      - 1) Color: As selected by Architect from full range of industry colors and color densities .
- B. Elastomeric-Seal Floor Joint Cover <**Insert drawing designation**>: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. EMSEAL Joint Systems, Ltd.
    - d. inpro Corporation.
    - e. MM Systems Corporation.
    - f. Nystrom, Inc.
    - g. Watson Bowman Acme Corp.
  - 2. Application: Floor to floor Floor to wall.
  - 3. Installation: Recessed.
  - 4. Load Capacity:
    - a. Uniform Load: [50 lb/sq. ft.] <Insert load>.
    - b. Concentrated Load: [300 lb] < Insert load>.
    - c. Maximum Deflection: [0.0625 inch] <Insert deflection>.
  - 5. Fire-Resistance Rating: Not less than [that of adjacent construction] <Insert rating>.

6. Exposed Metal:

7.

- a. Aluminum: Mill Manufacturer's standard .
  - 1) Color: As selected by Architect from full range of industry colors and color densities .
- Seal: Preformed elastomeric membrane or extrusion.
- a. Color: As selected by Architect from manufacturer's full range < Insert color>.

## 2.4 WALL EXPANSION JOINT COVERS

- A. Metal-Plate Wall Joint Cover <**Insert drawing designation**>: Metal cover plate fixed on one side of joint gap and free to slide on other.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. MM Systems Corporation.
    - e. Nystrom, Inc.
    - f. Watson Bowman Acme Corp.
  - 2. Application: Wall to corner.
  - 3. Fire-Resistance Rating: Not less than [that of adjacent construction] <Insert rating>.
  - 4. Exposed Metal:
    - a. Aluminum: Mill Manufacturer's standard .
      - 1) Color: As selected by Architect from full range of industry colors and color densities .
- B. Elastomeric-Seal Wall Joint Cover <**Insert drawing designation**>: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. MM Systems Corporation.
    - e. Nystrom, Inc.
    - f. Watson Bowman Acme Corp.
  - 2. Application: Wall to corner.
  - 3. Fire-Resistance Rating: Not less than [that indicated on Drawings] [that of adjacent construction] <Insert rating>.
  - 4. Exposed Metal:
    - a. Aluminum: Mill Manufacturer's standard .
      - 1) Color: As selected by Architect from full range of industry colors and color densities .
  - 5. Seal: Preformed elastomeric membranes or extrusions.
    - a. Color: [As selected by Architect from manufacturer's full range] <Insert color>.

# 2.5 CEILING EXPANSION JOINT COVERS

- A. Elastomeric-Seal Ceiling Joint Cover <**Insert drawing designation**>: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. MM Systems Corporation.
    - e. Nystrom, Inc.
    - f. Watson Bowman Acme Corp.
  - 2. Application: Wall to ceiling.
  - 3. Fire-Resistance Rating: Not less than [that of adjacent construction] <Insert rating>.
    - a. Aluminum: Mill Manufacturer's standard .
      - 1) Color: As selected by Architect from full range of industry colors and color densities .
  - 4. Seal: Preformed elastomeric membranes or extrusions.
    - a. Color: [As selected by Architect from manufacturer's full range] <Insert color>.

## 2.6 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers: Any material or material combination, to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M.
- 2.7 ALUMINUM FINISHES
  - A. Mill finish.
  - B. Clear Anodic Finish: AAMA 611, or thicker.
  - C. Color Anodic Finish: AAMA 611, or thicker.

## 2.8 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
  - 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies.
- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
  - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
  - Install frames in continuous contact with adjacent surfaces.
     a. Shimming is not permitted.
  - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
  - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
  - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
  - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

- F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- H. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
  - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- I. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

### 3.2 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.13

SECTION 079513.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior expansion joint covers.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each expansion joint cover assembly.
  - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams [and a tabular schedule of expansion joint cover assemblies].
- C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified.

## PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to [UL 2079] [or] [ASTM E1966] by a qualified testing agency.
  - 1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.
- B. Expansion Joint Design Criteria < Insert drawing designation >:
  - 1. Type of Movement: Thermal Wind sway.

- a. Nominal Joint Width: [As indicated on Drawings] < Insert width>.
- b. Minimum Joint Width: [As indicated on Drawings] < Insert width>.
- c. Maximum Joint Width: [As indicated on Drawings] < Insert width>.

# 2.3 EXTERIOR EXPANSION JOINT COVERS

- A. Exterior Metal-Plate Joint Cover <**Insert drawing designation**>: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
    - d. Nystrom, Inc.
    - e. Watson Bowman Acme Corp.
  - 2. Application: Wall to wall .
  - 3. Installation: Surface mounted.
  - 4. Fire-Resistance Rating: Not less than that of adjacent construction .
  - 5. Exposed Metal:
    - a. Aluminum: Manufacturer's standard .
      - 1) Color: As selected by Architect from full range of industry colors and color densities <**Insert color**>.

## 2.4 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers: Any material or material combination, to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

## 2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] or thicker.
- B. Color Anodic Finish: AAMA 611, or thicker.

## 2.6 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard moisture barrier consisting of a continuous, waterproof membrane within joint and attached to substrate on sides of joint.

- 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.
- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
  - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
  - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
  - 4. Install frames in continuous contact with adjacent surfaces.a. Shimming is not permitted.
  - 5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
  - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factoryfabricated termination devices.

- H. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
  - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- I. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.
- J. Transition to Roof Expansion Joint Covers: Coordinate installation of exterior wall and soffit expansion joint covers with roof expansion joint covers specified in Section 077129 "Manufactured Roof Expansion Joints." [Install factory-fabricated units at transition between exterior walls and soffits and roof expansion joint cover assemblies.]

#### 3.2 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.16

EXTERIOR EXPANSION JOINT COVER ASSEMBLIES 079513.16 - 4

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# SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes:
  - 1. Exterior standard steel doors and frames.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

#### 1.4 INFORMATIONAL SUBMITTALS

#### 1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.
- 1.6 QUALITY ASSURANCE
  - A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
    - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

### HOLLOW METAL DOORS AND FRAMES 081113 - 1

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Ceco Door; ASSA ABLOY.
  - 2. Curries Company; ASSA ABLOY.
  - 3. DCI Hollow Metal.
  - 4. Fleming Door Products Ltd.; Assa Abloy Group Company.
  - 5. Mesker Door Inc.
  - 6. Steelcraft; an Allegion brand.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

### 2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule SEE FLOOR PLANS .
  - 1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches.
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
    - d. Edge Construction: Model 1, Full Flush .
    - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
    - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same

HOLLOW METAL DOORS AND FRAMES

material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.

- h. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.
- 2. Frames:
  - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
  - b. Construction: Face welded .

### 2.4 INTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

- A. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. [At locations indicated in the Door and Frame Schedule] <Insert locations>.
  - 1. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide.
    - b. [Sidelite] Frames: Fabricated from same material as adjacent door frame.
    - c. Construction: [**Face**] welded.

#### 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
  - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.
## 2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.7 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding, or by rigid mechanical anchors.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surfacemounted door hardware.
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

- 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
- 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
- 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
- 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
- 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

# 2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

# PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surfacemounted door hardware.

## 3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  - 2. Fire-Rated Openings: Install frames according to NFPA 80.
  - 3. Floor Anchors: Secure with postinstalled expansion anchors.

#### HOLLOW METAL DOORS AND FRAMES 081113 - 5

- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 4. Solidly pack mineral-fiber insulation inside frames.
- 5. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - 3. Smoke-Control Doors: Install doors according to NFPA 105.
- C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

## 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
  - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 101.

## 3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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# SECTION 081416 - FLUSH WOOD DOORS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Five-ply flush wood veneer-faced doors for transparent finish.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
  - 1. Door core materials and construction.
  - 2. Door edge construction
  - 3. Door face type and characteristics.
  - 4. Door trim for openings.
  - 5. Door frame construction.
  - 6. Factory-machining criteria.
  - 7. Factory- finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
  - 1. Door schedule indicating door location, type, size, fire protection rating, and swing.
  - 2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
  - 3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
  - 4. Dimensions and locations of blocking for hardware attachment.
  - 5. Clearances and undercuts.
  - 6. Requirements for veneer matching.
- C. Samples: For factory-finished doors .

- 1.3 INFORMATIONAL SUBMITTALS
- 1.4 CLOSEOUT SUBMITTALS
- 1.5 QUALITY ASSURANCE

## PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
  - A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252.
- 2.2 FLUSH WOOD DOORS, GENERAL
- 2.3 SOLID-CORE, FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH
  - A. Interior Doors :
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - a. Eggers Industries.
      - b. Masonite Architectural.
      - c. Oshkosh Door Company.
      - d. VT Industries Inc.
    - 2. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty .
    - 3. Architectural Woodwork Standards Grade: Premium .
    - 4. Faces: Single-ply wood veneer not less than 1/50 inch thick.
      - a. Species: Select white maple .
        - b. Cut: Plain sliced (flat sliced).
        - c. Match between Veneer Leaves: Book match.
        - d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
        - e. Pair and Set Match: Provide for doors hung in same opening.
        - f. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet <**Insert dimension**> or more.
        - g. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
        - h. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064216 "Flush Wood Paneling."

#### FLUSH WOOD DOORS 081416 - 2

- 5. Exposed Vertical Edges: Same species as faces Architectural Woodwork Standards edge Type A .
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
  - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

1) Screw-Holding Capability: 475 lbf in accordance with WDMA T.M. 10.

- 6. Core for Non-Fire-Rated Doors:
  - a. ANSI A208.1, Grade LD-1 particleboard.
    - 1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
      - a) 5-inch top-rail blocking, in doors indicated to have closers.
      - b) 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
      - c) 5-inch midrail blocking, in doors indicated to have exit devices.
    - Provide doors with WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."
  - b. Glued wood stave.
  - c. WDMA I.S. 10 structural composite lumber.
    - 1) Screw Withdrawal, Face: 475 lb.
    - 2) Screw Withdrawal, Edge: 475 lb.
  - d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
- 7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
  - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.
    - 1) 5-inch top-rail blocking.
    - 2) 5-inch bottom-rail blocking, in doors indicated to have protection plates.
    - 3) 5-inch midrail blocking, in doors indicated to have armor plates.
    - 4) 5-inch midrail blocking, in doors indicated to have exit devices.
- 8. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

# 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
  - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 2. Comply with NFPA 80 requirements for fire-rated doors.

#### FLUSH WOOD DOORS 081416 - 3

- B. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

# 2.5 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
  - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 2. Finish faces, all four edges, edges of cutouts, and mortises.
  - 3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
  - 1. Architectural Woodwork Standards [ANSI/WDMA I.S. 1A] Grade: Premium .
  - 2. Finish: Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
  - 3. Staining: As selected by Architect from manufacturer's full range .
  - 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
  - 5. Sheen: Satin .

# PART 3 - EXECUTION

- 3.1 INSTALLATION
  - A. Hardware: For installation, see Section 087100 "Door Hardware."
  - B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  - C. Install frames level, plumb, true, and straight.
    - 1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
    - 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
      - a. Secure with countersunk, concealed fasteners and blind nailing.
      - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
        - 1) For factory-finished items, use filler matching finish of items being installed.
    - 3. Install fire-rated doors and frames in accordance with NFPA 80.

#### FLUSH WOOD DOORS 081416 - 4

- 4. Install smoke- and draft-control doors in accordance with NFPA 105.
- D. Job-Fitted Doors:
  - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
    - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
  - 2. Machine doors for hardware.
  - 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  - 4. Clearances:
    - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
    - b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    - c. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.
    - d. Comply with NFPA 80 for fire-rated doors.
  - 5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
  - 6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

## 3.2 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

FLUSH WOOD DOORS

# SECTION 083323 - OVERHEAD COILING DOORS

# PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Service doors.
  - 2. Insulated service doors.
  - 3. Fire-rated service doors.
  - 4. Fire-rated, insulated service doors.
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, dooropening framing, corner guards, and bollards.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 2. Show locations of controls, locking devices detectors or replaceable fusible links, and other accessories.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Special warranty.
  - B. Maintenance data.
  - C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

## OVERHEAD COILING DOORS 083323 - 1

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
  - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: [**Two**] <**Insert number**> years from date of Substantial Completion.

## PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Complying with NFPA 80; listed and labeled by qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to [NFPA 252] [or] [UL 10B].
  - 1. Temperature-Rise Limit: [Where indicated] [At exit enclosures and exit passageways], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
  - 2. Smoke Control: [Where indicated] [In corridors and smoke barriers], provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to UL 1784; with maximum air-leakage rate of 3.0 cfm/sq. ft. of door opening at 0.10 inch wg for both ambient and elevated temperature tests.
- B. Accessibility Standard: Comply with applicable provisions in [the USDOJ's "2010 ADA Standards for Accessible Design"] [the ABA standards of the Federal agency having jurisdiction] [and] [ICC A117.1] <Insert requirement>.
- C. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
  - 1. Design Wind Load: [As indicated on Drawings] [Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward] <Insert loads>.

2. Testing: According to ASTM E330/E330M [or DASMA 108 for garage doors and complying with acceptance criteria of DASMA 108] <Insert requirement>.

## 2.2 DOOR ASSEMBLY < Insert drawing designation>

- A. Service Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ACME Rolling Doors.
    - b. Advanced Door Technologies.
    - c. Alumatec Pacific Products.
    - d. Amarr; an ASSA ABLOY Group company.
    - e. ASTA America; Janus International Group.
    - f. C.H.I. Overhead Doors, Inc.
    - g. Cookson; a CornellCookson company.
    - h. Cornell; a CornellCookson company.
    - i. Overhead Door Corporation.
    - j. Raynor Garage Doors.
- B. Operation Cycles: Door components and operators capable of operating for not less than [50,000] <Insert number>.
- C. Insulated Door Curtain R-Value: [4.5 deg F x h x sq. ft./Btu] <Insert value>.
- D. Insulated Door Assembly U-Factor: [0.90 Btu/deg F x h x sq. ft.] <Insert value>.
- E. Door Curtain Material: Galvanized steel .
- F. Door Curtain Slats: [Flat] profile slats of [1-7/8-inch] [2-5/8-inch] [3-1/4-inch] <Insert dimension> center-to-center height.
- G. Bottom Bar: Two angles, each not less than [1-1/2 by 1-1/2 by 1/8 inch thick] <Insert dimensions>; fabricated from [hot-dip galvanized steel] [stainless steel] [or] [aluminum extrusions] and finished [to match door] <Insert requirement>.
- H. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- I. Locking Devices: Equip door with slide bolt for padlock [and].
- J. Electric Door Operator:
  - 1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day .
  - 2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
  - 3. Motor Exposure: [Interior].

#### OVERHEAD COILING DOORS 083323 - 3

- 4. Motor Electrical Characteristics:
  - a. Horsepower: [1/2] [1] [2] [3] < Insert value> hp.
  - b. Voltage: [115 V ac, single phase, 60 Hz] [208 V ac, single phase, 60 Hz] [230 V ac, single phase, 60 Hz] [208 V ac, three phase, 60 Hz] [230 V ac, three phase, 60 Hz] [460 V ac, three phase, 60 Hz].
- 5. Emergency Manual Operation: Chain type.
- 6. Obstruction-Detection Device: Automatic photoelectric sensor electric sensor edge on bottom bar .
- 7. Control Station(s): Interior mounted .
- 8. Other Equipment: .
- K. Curtain Accessories: Equip door with push/pull handles pull-down strap [and].
- L. Door Finish:
  - 1. Baked-Enamel or Powder-Coated Finish: [Color as indicated by manufacturer's designations] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] < Insert color>.
  - 2. Interior Curtain-Slat Facing: [Finish as selected by Architect from manufacturer's full range] <Insert finish>.

## 2.3 FIRE-RATED DOOR ASSEMBLY < Insert drawing designation>

- A. Fire-Rated Service Insulated Service Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ACME Rolling Doors.
    - b. Advanced Door Technologies.
    - c. Alpine Overhead Doors, Inc.
    - d. ASTA America; Janus International Group.
    - e. Cornell; a CornellCookson company.
    - f. Lawrence Roll-Up Doors, Inc.
    - g. Overhead Door Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than [50,000] <Insert number>.
- C. Fire Rating: [1 hour] .
- D. Insulated Door Curtain R-Value: [4.5 deg F x h x sq. ft./Btu] <Insert value>.
- E. Insulated Door Assembly U-Factor: [0.90 Btu/deg F x h x sq. ft.] <Insert value>.
- F. Door Curtain Material: Galvanized steel.
- G. Door Curtain Slats: [Flat] profile slats of [1-7/8-inch] [2-5/8-inch] [3-1/4-inch] <Insert dimension> center-to-center height.

## OVERHEAD COILING DOORS 083323 - 4

- 1. Insulated-Slat Interior Facing: Metal.
- H. Bottom Bar: Two angles, each not less than [1-1/2 by 1-1/2 by 1/8 inch thick] <Insert dimensions>; fabricated from [hot-dip galvanized steel] [stainless steel] [or] [aluminum extrusions] and finished [to match door] <Insert requirement>.
- I. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- J. Locking Devices: Equip door with slide bolt for padlock [and].
- K. Electric Door Operator:
  - 1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day .
  - 2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
  - 3. Motor Exposure: [Interior].
  - 4. Motor Electrical Characteristics:
    - a. Horsepower: [1/2] [1] [2] [3] <Insert value> hp.
    - b. Voltage: [115 V ac, single phase, 60 Hz] [208 V ac, single phase, 60 Hz] [230 V ac, single phase, 60 Hz] [208 V ac, three phase, 60 Hz] [230 V ac, three phase, 60 Hz] [460 V ac, three phase, 60 Hz].
  - 5. Emergency Manual Operation: [**Chain**] type.
  - 6. Obstruction-Detection Device: Automatic photoelectric sensor electric sensor edge on bottom bar .
  - 7. Control Station(s): Interior mounted .
  - 8. Other Equipment: .
- L. Curtain Accessories: Equip door with smoke seals, automatic-closing device, push/pull handles pull-down strap [and].
- M. Door Finish:
  - 1. Baked-Enamel or Powder-Coated Finish: [Color as indicated by manufacturer's designations] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] < Insert color>.
  - 2. Interior Curtain-Slat Facing: [Finish as selected by Architect from manufacturer's full range] <Insert finish>.

## 2.4 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door

without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

- 1. Vision-Panel Glazing: Manufacturer's standard clear glazing, fabricated from transparent acrylic sheet or fire-protection-rated glass as required for type of door; set in glazing channel secured to curtain slats.
- 2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
- 3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with [minimum steel thickness of 0.010 inch] [and] [minimum aluminum thickness of 0.032 inch].
- 4. Plastic Interior Curtain-Slat Facing: Extruded PVC plastic with maximum flamespread index of [25] [75] [200] and smoke-developed index of 450, according to ASTM E84 or UL 723.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

## 2.6 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
  - 1. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
  - 2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

## 2.7 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

- 1. Lock Cylinders: As [specified in Section 087100 "Door Hardware"] [specified in Section 087111 "Door Hardware (Descriptive Specification)"] [standard with manufacturer] [and keyed to building keying system].
- 2. Keys: [Two] [Three] < Insert number > for each cylinder.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.8 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- B. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
- C. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- D. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- E. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.
- F. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and reset release mechanism. [Testing for manually operated doors allows resetting by opening the door without retensioning the counterbalance mechanism] [Release mechanism for motor-operated doors allows testing without mechanical release of the door.] Automatic-closing device are to be designed for activation by the following:
  - Replaceable fusible links with temperature rise and melting point of [165 deg F] <Insert temperature> interconnected and mounted on both sides of door opening.
  - 2. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
  - 3. Manufacturer's standard UL-labeled heat detector and door-holder-release devices.
  - 4. Building fire-detection, smoke-detection, and -alarm systems.

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## 2.9 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use greasesealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.10 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
  - 1. Comply with NFPA 70.
  - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Motors: Reversible-type motor [with controller (disconnect switch)] for motor exposure indicated for each door assembly.
  - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
  - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- D. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. [For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.] [For fire-rated doors, activation delays closing.]
  - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
    - a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained or constant pressure on close button.
  - 2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

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- a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- 3. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device.
- E. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
  - 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
  - 2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed [25 lbf] [30 lbf] <Insert value>.
- G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- H. Motor Removal: Design operator so motor may be removed without disturbing limitswitch adjustment and without affecting emergency manual operation.
- I. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.
- J. Portable Radio-Control System: Consisting of [one] [two] <Insert number> of the following per door operator:
  - 1. Three-channel universal coaxial receiver to open, close, and stop door.
  - 2. Portable control device to open and stop door may be momentary-contact type; control to close door is to be sustained- or constant-pressure type.

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Fire-Rated Doors: Install according to NFPA 80.

- C. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.
- D. Power-Operated Doors: Install [automatic garage doors openers] according to UL 325.

## 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to furnish reports to Architect.
- B. Perform the following tests and inspections:
  - 1. Test door release, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of closed door. Reset door-closing mechanism after successful test.
  - 2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in [NFPA 80] [and] [NFPA 101].

#### 3.3 DEMONSTRATION

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

END OF SECTION 083323

**OVERHEAD COILING DOORS** 

# SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Storefront framing.
  - 2. Manual-swing entrance doors.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
  - 2. Include point-to-point wiring diagrams.
- C. Samples: For each type of exposed finish required.
- D. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance data.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.6 WARRANTY

- A. Special Warranty: **[Installer**] agrees to repair or replace components of aluminumframed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:

#### ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS 084113 - 2

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- 1. Deflection Normal to Wall Plane: Limited to [edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite] <Insert deflection limit> or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
- 2. Deflection Parallel to Glazing Plane: Limited to [1/360 of clear span or 1/8 inch , whichever is smaller]
  - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- E. Structural: Test according to ASTM E 330/E 330M as follows:
  - 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
  - 2. When tested at [**150**] <**Insert number**> percent of positive and negative windload design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding [**0.2**] <**Insert number**> percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than [10] <**Insert number**> seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  - 1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. .
  - 2. Entrance Doors:
    - a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-airpressure differential of 1.57 lbf/sq. ft. .
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. <**Insert value**>.
- H. Energy Performance: Certify and label energy performance according to NFRC as follows:
  - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.41 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces.

# 2.2 STOREFRONT SYSTEMS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - 1. Arcadia, Inc.
  - 2. Kawneer North America, an Arconic company.
  - 3. Oldcastle BuildingEnvelope™.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Exterior Framing Construction: Thermally broken .
  - 2. Interior Vestibule Framing Construction: Nonthermal .
  - 3. Glazing System: Retained mechanically with gaskets on four sides.
  - 4. Finish: Clear anodic finish .
  - 5. Fabrication Method: Field-fabricated stick system.
  - 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

## 2.3 ENTRANCE DOOR SYSTEMS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - 1. Arcadia, Inc.
  - 2. Kawneer North America, an Arconic company.
  - 3. Oldcastle BuildingEnvelope™.
- B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
  - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior .
  - 2. Door Design: Narrow stile; 2-1/8-inch nominal width .
  - 3. Glazing Stops and Gaskets: Square , snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

#### ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS 084113 - 4

# 2.4 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

# 2.5 MATERIALS

- A. Sheet and Plate: ASTM B 209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- C. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- D. Structural Profiles: ASTM B 308/B 308M.
- E. Steel Reinforcement:
  - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
  - 4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

# 2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from exterior .
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

# ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS 084113 - 5

- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

#### 2.7 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: Dark bronze **<insert color>**.
  - 2. Color: As selected by Architect from full range of industry colors and color densities.
- B. High-Performance Organic Finish: -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range .

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

#### ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS 084113 - 6

- 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 088000 "Glazing."
- F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

#### 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts .
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084113

#### SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Mechanical and electrified door hardware
  - 2. Electronic access control system components
- B. Section excludes:
  - 1. Windows
  - 2. Cabinets (casework), including locks in cabinets
  - 3. Signage
  - 4. Toilet accessories
  - 5. Overhead doors
- C. Related Sections:
  - 1. Division 01 Section "Alternates" for alternates affecting this section.
  - 2. Division 06 Section "Rough Carpentry"
  - 3. Division 06 Section "Finish Carpentry"
  - 4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
  - 5. Division 08 Sections:
    - a. "Metal Doors and Frames"
    - b. "Flush Wood Doors"
    - c. "Stile and Rail Wood Doors"
    - d. "Interior Aluminum Doors and Frames"
    - e. "Aluminum-Framed Entrances and Storefronts"
    - f. "Stainless Steel Doors and Frames"
    - g. "Special Function Doors"
    - h. "Entrances"
  - 6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
  - 7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

#### 1.02 REFERENCES

- A. UL Underwriters Laboratories
  - 1. UL 10B Fire Test of Door Assemblies
  - 2. UL 10C Positive Pressure Test of Fire Door Assemblies
  - 3. UL 1784 Air Leakage Tests of Door Assemblies
  - 4. UL 305 Panic Hardware

- B. DHI Door and Hardware Institute
  - 1. Sequence and Format for the Hardware Schedule
  - 2. Recommended Locations for Builders Hardware
  - 3. Keying Systems and Nomenclature
  - 4. Installation Guide for Doors and Hardware
- C. NFPA National Fire Protection Association
  - 1. NFPA 70 National Electric Code
  - 2. NFPA 80 2016 Edition Standard for Fire Doors and Other Opening Protectives
  - 3. NFPA 101 Life Safety Code
  - 4. NFPA 105 Smoke and Draft Control Door Assemblies
  - 5. NFPA 252 Fire Tests of Door Assemblies
- D. ANSI American National Standards Institute
  - 1. ANSI A117.1 2017 Edition Accessible and Usable Buildings and Facilities
  - 2. ANSI/BHMA A156.1 A156.29, and ANSI/BHMA A156.31 Standards for Hardware and Specialties
  - 3. ANSI/BHMA A156.28 Recommended Practices for Keying Systems
  - 4. ANSI/WDMA I.S. 1A Interior Architectural Wood Flush Doors
  - 5. ANSI/SDI A250.8 Standard Steel Doors and Frames

#### 1.03 SUBMITTALS

- A. General:
  - 1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
  - 2. Prior to forwarding submittal:
    - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
    - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
    - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
- B. Action Submittals:
  - 1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
  - 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
    - a. Wiring Diagrams: For power, signal, and control wiring and including:
      - 1) Details of interface of electrified door hardware and building safety and security systems.
      - 2) Schematic diagram of systems that interface with electrified door hardware.
      - 3) Point-to-point wiring.
      - 4) Risers.

- 3. Door Hardware Schedule:
  - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
  - c. Indicate complete designations of each item required for each opening, include:
    - 1) Door Index: door number, heading number, and Architect's hardware set number.
    - 2) Quantity, type, style, function, size, and finish of each hardware item.
    - 3) Name and manufacturer of each item.
    - 4) Fastenings and other pertinent information.
    - 5) Location of each hardware set cross-referenced to indications on Drawings.
    - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for hardware.
    - 8) Door and frame sizes and materials.
    - 9) Degree of door swing and handing.
    - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
- 4. Key Schedule:
  - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
  - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
  - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
  - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
  - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
  - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Closeout Submittals:
  - 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Final approved hardware schedule edited to reflect conditions as installed.
    - d. Final keying schedule
    - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
    - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

#### 1.04 QUALITY ASSURANCE

- A. Qualifications and Responsibilities:
  - 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  - 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
  - 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
    - a. For door hardware: DHI certified AHC or DHC.
    - b. Can provide installation and technical data to Architect and other related subcontractors.
    - c. Can inspect and verify components are in working order upon completion of installation.
    - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
  - 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Certifications:
  - 1. Fire-Rated Door Openings:
    - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
    - b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
  - 2. Smoke and Draft Control Door Assemblies:
    - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
  - 3. Electrified Door Hardware
    - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
  - 4. Accessibility Requirements:

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- a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
  - 1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      - 2) Preliminary key system schematic diagram.
      - 3) Requirements for key control system.
      - 4) Requirements for access control.
      - 5) Address for delivery of keys.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

- a. Mechanical Warranty
  - 1) Locks
    - a) Schlage L Series: 3 years
    - b) Schlage ND Series: 10 years
  - 2) Exit Devices
    - a) Von Duprin: 3 years
  - 3) Closers
    - a) LCN 4000 Series: 30 years
- b. Electrical Warranty
  - 1) Locks
    - a) Schlage: 1 year
  - 2) Exit Devices
    - a) Von Duprin: 1 year

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

## PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

#### 2.02 MATERIALS

- A. Fabrication
  - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
  - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
  - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
  - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

#### 2.03 HINGES

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Ives 5BB series
  - 2. Acceptable Manufacturers and Products:
    - a. Hager BB1191/1279 series
    - b. McKinney TB series
    - c. Stanley FBB series
- B. Requirements:
  - 1. Provide hinges conforming to ANSI/BHMA A156.1.
  - 2. Provide five knuckle, ball bearing hinges.
  - 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
    - a. Exterior: Standard weight, steel, 4-1/2 inches (114 mm) high
    - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
  - 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
    - a. Exterior: Heavy weight, steel, 5 inches (127 mm) high
    - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
  - 5. 2 inches or thicker doors:
    - a. Exterior: Heavy weight, steel, 5 inches (127 mm) high
    - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
  - 6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
  - 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
  - 8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
  - 9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
    - a. Steel Hinges: Steel pins
    - b. Non-Ferrous Hinges: Stainless steel pins
    - c. Out-Swinging Exterior Doors: Non-removable pins
    - d. Out-Swinging Interior Lockable Doors: Non-removable pins
    - e. Interior Non-lockable Doors: Non-rising pins

#### 2.04 CONTINUOUS HINGES

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. Select
    - b. Stanley
    - c. Roton
    - d. ABH
    - e. Hager
- B. Requirements:
  - 1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
  - 2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
  - 3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
  - 4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
  - 5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
  - 6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
  - 7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.05 ELECTRIC POWER TRANSFER

- A. Manufacturers:
  - 1. Scheduled Manufacturer and Product:
    - a. Von Duprin EPT-10
  - 2. Acceptable Manufacturers and Products:
    - a. Securitron CEPT-10
    - b. Precision EPT-12C
- B. Requirements:
  - 1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
  - 2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

#### 2.06 FLUSH BOLTS

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. lves
  - 2. Acceptable Manufacturers:
    - a. DCI
    - b. Trimco
- B. Requirements:
  - Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

#### 2.07 COORDINATORS

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. DCI
    - b. Trimco
- B. Requirements:
  - 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
  - 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

## 2.08 MORTISE LOCKS

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Schlage L9000 series

- 2. Acceptable Manufacturers and Products:
  - a. Sargent 8200 series
- B. Requirements:
  - 1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
  - 2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
  - 3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
  - 4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
  - 5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
  - 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
  - 7. Provide motor based electrified locksets that comply with the following requirements:
    - a. Universal input voltage single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
    - b. Fail Safe/Fail Secure changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
    - c. Low maximum current draw maximum 0.4 amps to allow for multiple locks on a single power supply.
    - d. Low holding current maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
    - e. Connections provide quick-connect Molex system standard.
  - 8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
    - a. Lever Design: 06A

#### 2.09 CYLINDRICAL LOCKS - GRADE 1

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Schlage ND series
  - 2. Acceptable Manufacturers and Products:
    - a. Sargent 11-Line
- B. Requirements:
- 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
- 2. Cylinders: Refer to "KEYING" article, herein.
- 3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
- 4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
- 5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
- 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
- 7. Provide electrified options as scheduled in the hardware sets.
- 8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
  - a. Vandlguard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
  - b. Lever Design: RHO

# 2.10 EXIT DEVICES

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Von Duprin 99/33A series
  - 2. Acceptable Manufacturers and Products:
    - a. Sargent 19-43-80 series
- B. Requirements:
  - 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
  - 2. Cylinders: Refer to "KEYING" article, herein.
  - 3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
  - 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
  - 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
  - 6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
  - 7. Provide flush end caps for exit devices.
  - 8. Provide exit devices with manufacturer's approved strikes.
  - 9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
  - 10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
  - 11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
  - 12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
  - 13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

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- 14. Provide electrified options as scheduled.
- 15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
- 16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

#### 2.11 ELECTRIC STRIKES

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Von Duprin 6000 Series
  - 2. Acceptable Manufacturers and Products:
    - a. Folger Adam 300 Series
    - b. HES 1006 Series
- B. Requirements:
  - 1. Provide electric strikes designed for use with type of locks shown at each opening.
  - 2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
  - 3. Where required, provide electric strikes UL Listed for fire doors and frames.
  - 4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

## 2.12 PASSIVE INFRARED MOTION SENSORS

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. Schlage SCAN II Series
  - 2. Acceptable Manufacturers and Products:
    - a. RCI 915 Series
    - b. Security Door Controls MD-31D Series
- B. Requirements:
  - 1. Provide motion sensors as specified in hardware groups.

#### 2.13 POWER SUPPLIES

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:

- a. Schlage/Von Duprin PS900 Series
- 2. Acceptable Manufacturers and Products:
  - a. Sargent 3500 series
- B. Requirements:
  - 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
  - 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
  - 3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
  - 4. Provide power supplies with the following features:
    - a. 12/24 VDC Output, field selectable.
    - b. Class 2 Rated power limited output.
    - c. Universal 120-240 VAC input.
    - d. Low voltage DC, regulated and filtered.
    - e. Polarized connector for distribution boards.
    - f. Fused primary input.
    - g. AC input and DC output monitoring circuit w/LED indicators.
    - h. Cover mounted AC Input indication.
    - i. Tested and certified to meet UL294.
    - j. NEMA 1 enclosure.
    - k. Hinged cover w/lock down screws.
    - I. High voltage protective cover.

#### 2.14 CYLINDERS

- A. Manufacturers:
  - 1. Scheduled Manufacturer and Product:
    - a. Schlage
  - 2. Acceptable Manufacturers and Products:
    - a. Sargent
- B. Requirements:
  - Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
- C. Construction Keying:
  - 1. Replaceable Construction Cores.
    - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.

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- 1) 3 construction control keys
- 2) 12 construction change (day) keys.
- b. Material Supplier along with Owner or Owner's Representative will replace temporary construction cores with permanent cores.

#### 2.15 KEYING

- A. Scheduled System:
  - 1. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Requirements:
  - 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
    - a. Master Keying system as directed by the Owner.
  - 2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
  - 3. Provide keys with the following features:
    - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
  - 4. Identification:
    - a. Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    - b. Identification stamping provisions must be approved by the Architect and Owner.
    - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
  - 5. Quantity: Furnish in the following quantities.
    - a. Change (Day) Keys: 3 per cylinder/core.
    - b. (Interchangeable Cores Only) Permanent Control Keys: 3.
    - c. Master Keys: 6.

#### 2.16 KEY CONTROL SYSTEM

- A. Manufacturers:
  - 1. Scheduled Manufacturer:

- a. Telkee
- 2. Acceptable Manufacturers:
  - a. HPC
  - b. Lund
- B. Requirements:
  - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
    - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
    - b. Provide hinged-panel type cabinet for wall mounting.

## 2.17 DOOR CLOSERS

- A. Manufacturers and Products:
  - 1. Scheduled Manufacturer and Product:
    - a. LCN 4010/4110/4020 series
  - 2. Acceptable Manufacturers and Products:
    - a. Sargent 281 series
- B. Requirements:
  - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
  - 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
  - 3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
  - 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
  - 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
  - 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
  - 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
  - 8. Pressure Relief Valve (PRV) Technology: Not permitted.
  - 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).

DOOR HARDWARE 087100 - 15 10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

#### 2.18 DOOR TRIM

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. Trimco
    - b. Burns
- B. Requirements:
  - 1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.19 PROTECTION PLATES

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. Burns
    - b. Rockwood
- B. Requirements:
  - 1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
  - 2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
  - 3. At fire rated doors, provide protection plates over 16 inches high with UL label.

#### 2.20 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. Manufacturers:
  - 1. Scheduled Manufacturers:
    - a. Glynn-Johnson

- 2. Acceptable Manufacturers:
  - a. Rixson
  - b. ABH
- B. Requirements:
  - 1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
  - 2. Provide friction type at doors without closer and positive type at doors with closer.

#### 2.21 DOOR STOPS AND HOLDERS

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. Trimco
    - b. Burns
- B. Provide door stops at each door leaf:
  - 1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
  - 2. Where a wall stop cannot be used, provide universal floor stops.
  - 3. Where wall or floor stop cannot be used, provide overhead stop.
  - 4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

# 2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Zero International
  - 2. Acceptable Manufacturers:
    - a. National Guard
    - b. Reese
- B. Requirements:
  - 1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.

- 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
- 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
- 4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

## 2.23 SILENCERS

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Ives
  - 2. Acceptable Manufacturers:
    - a. Burns
    - b. Trimco
- B. Requirements:
  - 1. Provide "push-in" type silencers for hollow metal or wood frames.
  - 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
  - 3. Omit where gasketing is specified.

# 2.24 DOOR POSITION SWITCHES

- A. Manufacturers:
  - 1. Scheduled Manufacturer:
    - a. Schlage
  - 2. Acceptable Manufacturers:
    - a. GE-Interlogix
    - b. Sargent
- B. Requirements:
  - 1. Provide recessed or surface mounted type door position switches as specified.
  - 2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

#### 2.25 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

- 1. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
- 2. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
- 3. Protection Plates: BHMA 630 (US32D)
- 4. Overhead Stops and Holders: BHMA 630 (US32D)
- 5. Door Closers: Powder Coat to Match
- 6. Wall Stops: BHMA 630 (US32D)
- 7. Latch Protectors: BHMA 630 (US32D)
- 8. Weatherstripping: Clear Anodized Aluminum
- 9. Thresholds: Mill Finish Aluminum

#### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
  - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
  - 2. Field modify and prepare existing doors and frames for new hardware being installed.
  - 3. When modifications are exposed to view, use concealed fasteners, when possible.
  - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
    - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
    - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
    - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

#### 3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Custom Steel Doors and Frames: HMMA 831.
  - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20

- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Replace construction cores with permanent cores as indicated in keying section.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.
- 3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

#### 3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

#### 3.06 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Elevation riser diagrams included in this section and/or section 28 1300 are based on the electrified products listed in the hardware sets. Any deviation from the specified products shall make the elevation riser diagrams null and void. If non-specified products are submitted on, material supplier to provide new elevation riser diagrams as part of their submittal package.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

## **M** = Hardware Item Requiring Electrical Coordination

DOOR NUMBER: 100A

EACH TO HAVE:

1	EA	CONT. HINGE	112XY EPT	62	28 IVE
1	EA	POWER TRANSFER	EPT10	× 68	9 VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-99-NL-OP-110MD 24 VDC	<b>∦</b> 62	26 VON
1	EA	RIM CYLINDER	20-057 ICX	62	26 SCH
1	EA	FSIC CORE	23-030	62	26 SCH
1	EA	OFFSET PULL	8190EZHD-10"	63	0 IVE
1	EA	OH STOP	100S	63	GLY
1	EA	SURFACE CLOSER	4021	68	9 LCN
1	EA	MOUNTING PLATE	4020-18G	68	9 LCN
1	EA	DOOR SWEEP	39A X D.W.	Α	ZER
1	EA	THRESHOLD	8655A X D.W.	Α	ZER
1	EA	CARD READER	MT11 OR MT15 - BY ACCESS CONTROL INTEGRATOR	N BL	K SCE
1	EA	DOOR CONTACT	679-05 WD OR HM AS REQ'D	🖊 BL	K SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	N LC	GR SCE
1	SET	SEALS	BY ALUM DOOR/FRAME MFG		
1	EA	WIRING DIAGRAMS	ELEVATION 3002	×	VON

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT CYLINDER. REQUEST TO EXIT SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM FREE EGRESS AT ALL TIMES.

DOOR NUMBER: 101A

#### EACH TO HAVE:

2	EA	CONT. HINGE	112XY	628	IVE
1	EA	REMOVABLE MULLION	KR4954-STAB-ANGLE PLATE	689	VON
1	EA	PANIC HARDWARE	99-EO	626	VON
1	EA	PANIC HARDWARE	99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
2	EA	OFFSET PULL	8190EZHD-10"	630	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4021	689	LCN
2	EA	MOUNTING PLATE	4020-18G	689	LCN
1	EA	MULLION SEAL	8780N X D.H.	BK	ZER
2	EA	DOOR SWEEP	39A X D.W.	А	ZER
1	EA	THRESHOLD	8655A X D.W.	А	ZER
1	SET	SEALS	BY ALUM DOOR/FRAME MFG		

# HARDWARE SET: 03

DOOF	R NUMB	ER:					
102A	N Contraction of the second se	114A	124A	135A	136A		
EAC⊦	I TO HA	VE:					
3	EA	HINGE		5BB1 4.5 X 4.5		652	IVE
1	EA	PRIVACY W/COIN	TURN	L9044 06A L583-363 OCC/VAC	L283-722	626	SCH
1	EA	SURFACE CLOSEF	र	4011		689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW B	B-CS	630	IVE
1	EA	WALL STOP		WS406/407CVX		630	IVE
3	EA	SILENCER		SR64		GRY	IVE

DOOF 103A	R NUMI	BER: 104A	105A			
EACH 3 1 1 1 1 3	I TO H/ EA EA EA EA EA EA EA	AVE: HINGE STOREROOM LC FSIC CORE SURFACE CLOS KICK PLATE WALL STOP SILENCER	DCK ER	5BB1 4.5 X 4.5 ND80TD RHO 23-030 4011 8400 10" X 2" LDW B-CS WS406/407CVX SR64	652 626 626 689 630 630 GRY	IVE SCH SCH LCN IVE IVE IVE
HARD	WARE	SET: 05				
DOOF 106A	R NUMI	BER: 106B	113A			
EACH 3 1 1 1 1 3	I TO HA EA EA EA EA EA EA EA	AVE: HINGE PUSH PLATE PULL PLATE SURFACE CLOS KICK PLATE WALL STOP SILENCER	ER	5BB1HW 4.5 X 4.5 8200 4" X 16" 8302 6" 4" X 16" 4011 8400 10" X 2" LDW B-CS WS406/407CVX SR64	652 630 630 689 630 630 GRY	IVE IVE ICN IVE IVE IVE
HARD	WARE	E SET: 06				
DOOF 107A	R NUMI	BER:				
EACH 3 1 1 1 3	I TO HA EA EA EA EA EA EA	AVE: HINGE CLASSROOM LC FSIC CORE WALL STOP SILENCER	ЮСК	5BB1 4.5 X 4.5 ND70TD RHO 23-030 WS406/407CVX SR64	652 626 626 630 GRY	IVE SCH SCH IVE IVE

DOOR NUMBER:

108A 108B

## EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

## HARDWARE SET: 08

DOOR NUMBER:

109A 110B

# EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12 OR 24 VDC AS REQ'D	N 630	VON
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CARD READER	MT11 OR MT15 - BY ACCESS CONTROL INTEGRATOR	N BLK	SCE
1	EA	DOOR CONTACT	679-05 WD OR HM AS REQ'D	🗡 BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	🗡 BLK	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	🖊 LGR	SCE
1	EA	WIRING DIAGRAMS	ELEVATION 1054	×	

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK. RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM FREE EGRESS AT ALL TIMES.

DOOR	NUMB	ER:						
110A 121A		111A	112A	115A	118A		120A	
EACH	TO HAV	VE:						
3	EA	HINGE		5BB1 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOC	K	ND80TD RHO			626	SCH
1	EA	FSIC CORE		23-030			626	SCH
1	EA	ELECTRIC STRIKE		6211 FSE 12 OR 24 REQ'D	VDC AS	×	630	VON
1	EA	SURFACE CLOSER	1	4011			689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW E	3-CS		630	IVE
1	EA	WALL STOP		WS406/407CVX			630	IVE
3	EA	SILENCER		SR64			GRY	IVE
1	EA	CARD READER		MT11 OR MT15 - BY CONTROL INTEGRA	ACCESS	×	BLK	SCE
1	EA	DOOR CONTACT		679-05 WD OR HM A	AS REQ'D	×	BLK	SCE
1	EA	MOTION SENSOR		SCANII 12/24 VDC		×	BLK	SCE
1	EA	POWER SUPPLY		PS902 BBK 900-2RS VAC	6 120/240	×	LGR	SCE
1	EA	WIRING DIAGRAMS	6	ELEVATION 1054		×		

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK. RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM FREE EGRESS AT ALL TIMES.

## HARDWARE SET: 10

DOOR NUMBER: 116A

# EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

DOOR NUMBER: 117A

# EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

#### HARDWARE SET: 12

#### DOOR NUMBER:

119A

# EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12 OR 24 VDC AS REQ'D	<b>⊮</b> 630	VON
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CARD READER	MT11 OR MT15 - BY ACCESS CONTROL INTEGRATOR	🖌 BLK	SCE
1	EA	DOOR CONTACT	679-05 WD OR HM AS REQ'D	🖌 BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	🖊 BLK	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	🗡 LGR	SCE
1	EA	WIRING DIAGRAMS	ELEVATION 1054	×	

DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK. RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM FREE EGRESS AT ALL TIMES.

DOOR NUMBER: 119B

# EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

# HARDWARE SET: 14

# DOOR NUMBER:

122A

# EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	99-EO	626	VON
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142A X D.W. +4"	AA	ZER
1	SET	SEALS	8303AA X D.S.	AA	ZER
1	EA	DOOR SWEEP	39A X D.W.	А	ZER
1	EA	THRESHOLD	8655A X D.W.	А	ZER

EXIT ONLY

DOOF		ER:					
123A		123D	130A	131A	131B	131C	
132A		132B	138C	138D			
EACH	ТО НА	VE:					
3	EA	HINGE		5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PANIC HARDW	ARE	99-L-06		626	VON
1	EA	RIM CYLINDER		20-057 ICX		626	SCH
1	EA	FSIC CORE		23-030		626	SCH
1	EA	SURFACE CLO	SER	4111 SCUSH		689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	6	630	IVE
1	EA	RAIN DRIP		142A X D.W. +4"		AA	ZER
1	SET	SEALS		8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP		39A X D.W.		А	ZER
1	EA	THRESHOLD		8655A X D.W.		A	ZER
HARD	WARE	SET: 16					
DOOF		ER:					
123B		123C	125A	125B	125D	127A	
129B		131E	131F	137E	138E	138F	
EACH	то на	VE:					
				ALL HARDWARE BY DC MANUFACTURER	DOR		
HARD	WARE	SET· 17					
DOOF	R NUMB	ER:					
125C		129A	129C	131D			
EACH	ΤΟ ΗΑ	VE:					
3	EA	HINGE		5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	CLASSROOM L	.OCK	ND70TD RHO		626	SCH
1	EA	FSIC CORE		23-030		626	SCH
1	EA	SURFACE CLO	SER	4111 SCUSH		689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	6	630	IVE
3	EA	SILENCER		SR64		GRY	IVE

DOOR NUMBER:

126A 126C

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT10	🖊 689	VON
2	EA	CONST LATCHING BOLT	FB51P OR FB61P AS REQ'D	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	EU STOREROOM LOCK	ND80TDEU RHO 14-049 RX 12V/24V DC	<b>⊮</b> 626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB2	689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	SEALS	188S X D.S.	BLK	ZER
1	EA	SECURITY ASTRAGAL	43SP X 188S X D.H.	600	ZER
2	EA	DOOR SWEEP	39A X D.W.	А	ZER
1	EA	THRESHOLD	8655A X D.W.	А	ZER
1	EA	CARD READER	MT11 OR MT15 - BY ACCESS CONTROL INTEGRATOR	🖌 BLK	SCE
2	EA	DOOR CONTACT	679-05 WD OR HM AS REQ'D	🗡 BLK	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	🖊 LGR	SCE
1	EA	WIRING DIAGRAMS	ELEVATION 2066	N	VON

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK. RX SWITCH IN EU LOCK SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM FREE EGRESS AT ALL TIMES.

DOOR NUMBER: 126B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12 OR 24 VDC AS REQ'D	<b>⊮</b> 630	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	SEALS	188S X D.S.	BLK	ZER
1	EA	DOOR BOTTOM	111AA X D.W.	AA	ZER
1	EA	THRESHOLD	548A X D.W.	А	ZER
1	EA	CARD READER	MT11 OR MT15 - BY ACCESS CONTROL INTEGRATOR	🖋 BLK	SCE
1	EA	DOOR CONTACT	679-05 WD OR HM AS REQ'D	💉 BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	💉 BLK	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	🖌 LGR	SCE
1	EA	WIRING DIAGRAMS	ELEVATION 1054	N	

DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK. RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM. KEY OVER-RIDE WILL CAUSE DOOR FORCED ALARM IN ACCESS CONTROL SYSTEM

# FREE EGRESS AT ALL TIMES.

#### HARDWARE SET: 20

DOOR NUMBER: 128A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/COIN TURN	L9044 06A L583-363 L283-722 OCC/VAC	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

DOC	OR NUM	BER:					
133	A	134A	137A	137B	138A	138B	
EAC	H TO HA	AVE:					
3	EA	HINGE		5BB1 4.5 X 4.5		652	IVE
1	EA	STOREROOM	LOCK	ND80TD RHO		626	SCH
1	EA	FSIC CORE		23-030		626	SCH
1	EA	OH STOP		90S		630	GLY
1	EA	SURFACE CLC	DSER	4011		689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	3	630	IVE
3	EA	SILENCER		SR64		GRY	IVE
HAR	DWARE	E SET: 22					
DOC		BER:					
133	В	134B	137C	137D			
EAC	н то ни	AVE:					
3	EA	HINGE		5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM	LOCK	ND96TD RHO		626	SCH
1	EA	FSIC CORE		23-030		626	SCH
1	EA	LOCK GUARD		LG13		630	IVE
1	EA	SURFACE CLC	DSER	4111 SCUSH		689	LCN
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	3	630	IVE
1	EA	RAIN DRIP		142A X D.W. +4"		AA	ZER
1	SET	SEALS		8303AA X D.S.		AA	ZER

ZER

ZER

1EADOOR SWEEP39A X D.W.A1EATHRESHOLD8655A X D.W.A

**END OF SECTION** 

# SECTION 088000 - GLAZING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes glazing, including those specified in other Sections where glazing requirements are specified by reference to this Section.
  - 1. Monolithic glass.
  - 2. Insulating glass.
  - 3. Laminated glass.

# 1.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind loads without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

#### 1.3 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of the specified products; 12 inches square.
- C. Qualification Data: For installers.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass.
- E. Warranties: Sample of special warranties.

# 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Source Limitations for Glass: Obtain ultraclear float glass and insulating glass from single source from single manufacturer for each glass type.

- D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- E. 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. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- F. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

# 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

## 1.7 WARRANTY

A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written

instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - GLASS PRODUCTS, GENERAL:

- 2.1 Manufacturers:
  - A. AFGD, Inc. www.afgd.com.
    - 1. Guardian Industries. www.guardian.com.
    - 2. Pilkington. www.pilkington.com.
    - 3. PPG Industries, Inc. www.ppgglazing.com.
  - B. Approved Fabricators:
    - 1. Glaz-Tech Industries Inc. www.glaztech.com
    - 2. Oldcastle Glass, Inc. www.oldcastleglass.com.
    - 3. Viracon. www.viracon.com.
  - C. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
    - 1. Obtain monolithic glass from single source from single manufacturer.
    - 2. Obtain laminated glass from single source from single manufacturer.
    - 3. Obtain insulating glass units from single source from single manufacturer.
  - D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

## 2.2 MONOLITHIC GLASS

- A. Clear Glass: ASTM C 1036, Type I, Quality-Q3, Class I, fully-tempered.
  - 1. Thickness: 1/4 inch.
- B. Ultraclear Glass: ASTM C 1036, Type I, Quality-Q3, Class I, fully-tempered complying with visible light transmission not less than 91 percent.
  - 1. Thickness: 1/4 inch.
  - 2. Products:
    - a. Krystal Klear by AFG Industries, Inc.
    - b. Ultrawhite by Guardian Industries Corp.
    - c. Optiwhite by Pilkington North America.
    - d. Starphire by PPG Industries, Inc.

# 2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
- B. Clear:
  - 1. Glass: Two plies of 1/8 inch clear tempered glass.
  - 2. Interlayer: 0.030 inch, clear, polyvinyl butyral (PVB).

# 2.4 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
- B. Low-E Insulating Glass Units:
  - 1. Conformance: ASTM E 2190, Class CBA.
  - 2. Outboard Lite: Sputter-coated clear float glass.
    - a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
    - b. Vacuum Deposition Sputtered Coating: ASTM C 1376.
    - c. Coating on Surface No. 2:
      - 1) SunGuard SuperNeutral 68 (SN 68) by Guardian Corp.
      - 2) Solarban 60 by PPG.
    - d. Glass Thickness: 1/4 inch.
    - e. Heat Treatment: Fully Tempered.
  - 3. Air Space: 1/2 inch wide, hermetically sealed, dehydrated air space.
  - 4. Inboard Lite: Clear float glass.
    - a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
    - b. Glass Thickness: 1/4 inch.
    - c. Heat Treatment: Fully Tempered.
  - 5. Glass Unit Performance Characteristics:
    - a. Visible Light Transmittance: 68 percent.
    - b. Visible Light Reflectance Outdoors: 11 percent.
    - c. Direct Solar Energy Transmittance: 33 percent.
    - d. Direct Solar Energy Reflectance Outdoors: 32 percent.
    - e. Winter U-Value Nighttime: 0.29.
    - f. Summer U-Value Daytime: 0.28.
    - g. Shading Coefficient: 0.43.
    - h. Solar Heat Gain Coefficient: 0.38.
    - i. Summer Relative Heat Gain: 90.
  - 6. Edge Seals: ASTM E 773, with aluminum spacers and polysulfide sealant for glass-to-spacer seals.
  - 7. Sealant: Approved by glass manufacturer.
- C. High Performance Low-E Insulating Glass Unit:

- 1. Conformance: ASTM E 2190, Class CBA.
- 2. Outboard Lite:
  - a. Ultraclear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3; and with visible light transmission of not less than 91 percent.
  - b. Vacuum Deposition Sputtered Coating: ASTM C 1376.
  - c. Coating on Surface No. 2:
    - 1) SunGuard (SNX62/27), on Ultrawhite glass, by Guardian Corp. 2) Solarban 70XL, on Starphire ultraclear glass, by PPG.
  - d. Glass Thickness: 1/4 inch.
  - e. Heat Treatment: Fully Tempered.
- 3. Air Space: 1/2 inch wide, hermetically sealed, dehydrated air space.
- 4. Inboard Lite:
  - a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
  - b. Glass Thickness: 1/4 inch.
  - c. Heat-Treatment: Fully Tempered.
- 5. Glass Unit Performance Characteristics:
  - a. Visible Light Transmittance: 63 percent minimum.
  - b. Winter U-Value Nighttime: 0.28 maximum.
  - c. Summer U-Value Daytime: 0.27 maximum.
  - d. Shading Coefficient: 0.30 minimum.
  - e. Solar Heat Gain Coefficient: 0.27 maximum.
  - f. Light to Solar Heat Gain: 2.37.
- 6. Edge Seals: ASTM E 773, with aluminum spacers and polysulfide sealant for glass-to-spacer seals.
- 7. Sealant: Approved by glass manufacturer.
- 2.5 GLAZING SEALANTS
  - A. General:
    - 1. Compatibility: Provide 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. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
    - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
  - B. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
    - 1. Products:
      - a. BASF Building Systems; OmniPlus.
      - b. Dow Corning Corporation; 999-A.

- c. GE Advanced Materials Silicones; Contractors SCS1000 or Construction SCS1200. d. Pecora Corporation; 860.
- d. Tremco Incorporated; Proglaze.

# 2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

# 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

# 2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

## 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

## 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first 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 right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. H. Apply cap bead of elastomeric sealant over exposed edge of tape.

# 3.5 GASKET GLAZING (DRY)

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

# 3.6 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. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing 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 088000

# SECTION 092216 - NON-STRUCTURAL METAL FRAMING

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior partitions.
  - 2. Suspension systems for interior ceilings and soffits.

# 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

# 1.3 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

# 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for steel unless otherwise indicated.
  - 2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 , hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:

## NON-STRUCTURAL METAL FRAMING 092216 - 1

- a. CEMCO; California Expanded Metal Products Co.
- b. ClarkDietrich.
- c. SCAFCO Steel Stud Company.
- d. Steel Construction Systems.
- 2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection 0.0190 inch .
- 3. Depth: As indicated on Drawings 3-5/8 inches 6 inches 2-1/2 inches .
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
  - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
    - a. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) SCAFCO Steel Stud Company.
      - 4) Steel Construction Systems.
  - 2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) SCAFCO Steel Stud Company.
      - 4) Steel Construction Systems.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. MarinoWARE.
    - c. MRI Steel Framing, LLC.
    - d. SCAFCO Steel Stud Company.
    - e. Steel Construction Systems.
  - 2. Minimum Base-Steel Thickness: As indicated on Drawings .
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. MarinoWARE.
    - c. MRI Steel Framing, LLC.
    - d. SCAFCO Steel Stud Company.
    - e. Steel Construction Systems.

## NON-STRUCTURAL METAL FRAMING 092216 - 2

- 2. Minimum Base-Steel Thickness: As indicated on Drawings .
- 3. Depth: As indicated on Drawings 7/8 inch .
- F. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. MarinoWARE.
    - c. MRI Steel Framing, LLC.
    - d. SCAFCO Steel Stud Company.
    - e. Steel Construction Systems.
  - 2. Configuration: Asymmetrical or hat shaped.
- G. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. MarinoWARE.
    - c. MRI Steel Framing, LLC.
    - d. SCAFCO Steel Stud Company.
    - e. Steel Construction Systems.

# 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a basesteel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
  - 1. Depth: As indicated on Drawings .
- D. Furring Channels (Furring Members):
  - 1. Steel Studs and Tracks: ASTM C 645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
    - a. Minimum Base-Steel Thickness: 0.0190 inch .
    - b. Depth: As indicated on Drawings .
  - 2. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.

## NON-STRUCTURAL METAL FRAMING 092216 - 3

# 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

# PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
  - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
  - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
  - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

# 3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.

## NON-STRUCTURAL METAL FRAMING 092216 - 4

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- 3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistancerated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
  - a. Firestop Track: Where indicated, install to maintain continuity of fireresistance-rated assembly indicated.
- 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- C. Direct Furring:
  - 1. Screw to wood framing.
  - 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- D. Z-Shaped Furring Members:
  - 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
  - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.3 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

- a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards .
- 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 5. Do not attach hangers to steel roof deck.
- 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

# SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.
  - 2. Tile backing panels.
  - 3. Texture finishes.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each texture finish indicated on same backing indicated for Work.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- 2.2 GYPSUM BOARD, GENERAL
  - A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- 2.3 INTERIOR GYPSUM BOARD
  - A. Gypsum Wallboard: ASTM C 1396/C 1396M.
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
      - a. American Gypsum.
      - b. CertainTeed Corporation.
      - c. National Gypsum Company.
      - d. USG Corporation.

### GYPSUM BOARD 092900 - 1

- 2. Thickness: 1/2 inch.
- 3. Long Edges: Tapered .
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, undefined:
    - a. American Gypsum.
    - b. CertainTeed Corporation.
    - c. National Gypsum Company.
    - d. USG Corporation.
  - 2. Thickness: 5/8 inch.
  - 3. Long Edges: Tapered .
- C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. CertainTeed Corporation.
    - c. National Gypsum Company.
    - d. USG Corporation.
  - 2. Thickness: 1/2 inch.
  - 3. Long Edges: Tapered.
- D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. CertainTeed Corporation.
    - c. Georgia-Pacific Gypsum LLC.
    - d. National Gypsum Company.
    - e. USG Corporation.
  - 2. Core: As indicated 5/8 inch , Type X.
  - 3. Long Edges: Tapered.
  - 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

### 2.4 SPECIALTY GYPSUM BOARD

- 2.5 TILE BACKING PANELS
  - A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - a. CertainTeed Corporation.

- b. Georgia-Pacific Gypsum LLC.
- c. National Gypsum Company.
- d. USG Corporation.
- 2. Core: 5/8 inch , Type X.
- 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

### 2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet .
  - 2. Shapes:
    - a. Cornerbead.

# 2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.
- D. Joint Compound for Tile Backing Panels:
  - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

### 2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

# GYPSUM BOARD 092900 - 3

- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hilti, Inc.
    - b. Pecora Corporation.
    - c. USG Corporation.
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- F. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."
- 2.9 TEXTURE FINISHES
  - A. Primer: As recommended by textured finish manufacturer.
  - B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - a. CertainTeed Corporation.
      - b. National Gypsum Company.
      - c. USG Corporation.
    - 2. Texture: Spatter knock-down spray spatter .

### PART 3 - EXECUTION

### 3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated see drawings .
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

### 3.2 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

### 3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

# GYPSUM BOARD 092900 - 5

END OF SECTION 092900

# GYPSUM BOARD 092900 - 6

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# SECTION 093013 - CERAMIC TILING

### 1.1 QUALITY ASSURANCE

- A. Mockup for each type of floor tile installation.
- B. Mockup for each type of wall tile installation.

# 1.2 SUSTAINABILITY REQUIREMENTS

- A. :
  - 1. Low-emitting adhesives.
  - 2. Low-emitting floor sealer.

### 1.3 TILE PRODUCTS

- A. Mosaic Ceramic Tile Type : Unglazed Glazed.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Arizona Tile; or a comparable product by another manufacturer .
  - 2. Composition: Porcelain .
  - Size: [3 by 3 inches (76 by 76 mm)] [4 by 4 inches (102 by 102 mm)] [6 by 6 inches (152 by 152 mm)] [7-3/4 by 3-7/8 inches (197 by 98 mm)] [7-7/8 by 7-7/8 inches (200 by 200 mm)] [11-13/16 by 11-13/16 inches (300 by 300 mm)] [165 by 333 mm] [200 by 250 mm] [250 by 250 mm] [333 by 333 mm] [400 by 400 mm].
  - 4. Description: .
  - 5. Trim Shapes: Base cove Tapered transition.
- B. Porcelain Tile Type : Unglazed Glazed.
  - 1. Basis-of-Design Product: Daltile .
  - 2. Size: 4 by 4 inches 6 by 6 inches 7-3/4 by 3-7/8 inches 7-7/8 by 7-7/8 inches 11-13/16 by 11-13/16 inches .
  - 3. Face Size Variation: Rectified.
  - 4. Description: .
  - 5. Trim Shapes: Base cove Tapered transition.
- C. Glazed Wall Tile Type :
  - 1. Basis-of-Design Product: Daltile .
  - 2. Size: 4-1/4 by 4-1/4 inches 6 by 4-1/4 inches 6 by 6 inches .
  - 3. Face Size Variation: Rectified.
  - 4. Description: .
  - 5. Trim Shapes: Straight base .
- D. Accessories: Soap and paper holder.

# CERAMIC TILING 093013 - 1

# 1.4 ACCESSORY MATERIALS

- A. Thresholds: Slate.
- B. Tile Backing Panels: Cementitious backer units Fiber-cement underlayment.
- C. Waterproof Membrane: Chlorinated polyethylene sheet PVC sheet Polyethylene sheet
- D. Crack Isolation Membrane: Chlorinated polyethylene sheet PVC sheet Polyethylene sheet .
- E. Metal edge strips.

### 1.5 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floors on Concrete:
  - 1. TCNA F111: Cement mortar bed with cleavage membrane. Sand-portland cement Standard grout.
  - 2. TCNA F112: Cement mortar bed bonded to concrete. Sand-portland cement Standard grout.
  - 3. TCNA F113: Thinset mortar. Sand-portland cement Standard grout.
  - 4. TCNA F114: Cement mortar bed with cleavage membrane, epoxy grout.
  - 5. TCNA F115: Thinset mortar, epoxy grout.
  - 6. TCNA F116: Water-cleanable, tile-setting epoxy . Sand-portland cement Standard grout.
  - 7. TCNA F121: Cement mortar bed on waterproof membrane. Sand-portland cement Standard grout.
  - 8. TCNA F122: Thinset mortar on waterproof membrane. High-performance grout.
  - 9. TCNA F125A: Thinset mortar on crack isolation membrane. Sand-portland cement Standard grout.
  - 10. TCNA F131: Water-cleanable, tile-setting epoxy; epoxy grout.
  - 11. TCNA F132: Water-cleanable, tile-setting epoxy on cured cement mortar bed installed over cleavage membrane; epoxy grout.
- B. Interior Floors, Wood Subfloor:
  - 1. TCNA F121: Cement mortar bed on waterproof membrane. [Sand-portland cement] Standard grout.
  - 2. TCNA F141: Cement mortar bed with cleavage membrane. [Sand-portland cement] Standard grout.
  - 3. TCNA F142: Organic adhesive. Sand-portland cement [Standard] grout.
  - 4. TCNA F143: Water-cleanable, tile-setting epoxy; epoxy grout.
  - 5. TCNA F144: Water-cleanable, tile-setting epoxy on cementitious backer units or fiber-cement underlayment. Sand-portland cement Standard grout.
  - 6. TCNA F150/160: Thinset mortar on exterior-glue plywood. Sand-portland cement Standard grout.
- C. Interior Radiant Heat Floors, Concrete Subfloor:

- 1. TCNA RH110: Thinset mortar on crack isolation membrane; hydronic piping installed in concrete. Sand-portland cement Standard grout.
- 2. TCNA RH117: Cement mortar bed (thickset) with hydronic piping installed in mortar bed. Sand-portland cement Standard grout.
- 3. TCNA RH112: Thinset mortar on crack isolation membrane; hydronic piping encapsulated in cementitious self-leveling underlayment. Sand-portland cement Standard grout.
- 4. TCNA RH115: Thinset mortar; electric radiant system encapsulated in thinset mortar. Sand-portland cement Standard grout.
- 5. TCNA RH116: Thinset mortar on crack isolation membrane; electric radiant system encapsulated in cementitious self-leveling underlayment. Sand-portland cement Standard grout.
- D. Interior Radiant Heat Floors, Wood Subfloor:
  - 1. TCNA RH123: Thinset mortar on crack isolation membrane; hydronic piping encapsulated in cementitious self-leveling underlayment. Sand-portland cement Standard grout.
  - 2. TCNA RH130: Thinset mortar on exterior-glue plywood; electric radiant system encapsulated in thinset mortar. Sand-portland cement Standard grout.
  - 3. TCNA RH135: Thinset mortar on cementitious backer units or fiber-cement underlayment; electric radiant system encapsulated in thinset mortar. Sand-portland cement Standard grout.
  - 4. TCNA RH140: Thinset mortar on crack isolation membrane; electric radiant system encapsulated in cementitious self-leveling underlayment. Sand-portland cement Standard grout.
  - 5. TCNA RH141: Cement mortar bed (thickset) with hydronic piping installed in mortar bed. Sand-portland cement Standard grout.
- E. Interior Walls, Masonry or Concrete:
  - 1. TCNA W202: Thinset mortar. Sand-portland cement Standard grout.
  - 2. TCNA W211: Cement mortar bed bonded to substrate. Sand-portland cement Standard grout.
  - 3. TCNA W221: Cement mortar bed on metal lath over cleavage membrane . Sandportland cement Standard [**High-performance**] grout.
  - 4. TCNA W222: One-coat cement mortar bed on metal lath . Sand-portland cement Standard grout.
  - 5. TCNA W223: Organic adhesive. Sand-portland cement Standard grout.
- F. Interior Walls, Wood or Metal Studs or Furring:
  - 1. TCNA W221: Cement mortar bed over cleavage membrane on solid backing. Sand-portland cement Standard grout.
  - 2. TCNA W222: One-coat cement mortar bed over cleavage membrane on solid backing. Sand-portland cement Standard grout.
  - 3. TCNA W223: Organic adhesive on solid backing. Sand-portland cement Standard grout.
  - 4. TCNA W231/W241: Cement mortar bed. Sand-portland cement Standard grout.
  - 5. TCNA W242: Organic adhesive on gypsum board. Sand-portland cement Standard grout.

CERAMIC TILING 093013 - 3

- 6. TCNA W243: Thinset mortar on gypsum board. Sand-portland cement Standard grout.
- 7. TCNA W244: Thinset mortar on cementitious backer units or fiber-cement underlayment over vapor-retarder membrane . Sand-portland cement Standard grout.
- 8. TCNA W245 or TCNA W248: Thinset mortar on glass-mat, water-resistant gypsum backer board. Sand-portland cement Standard grout.
- G. Shower Receptor and Walls, Concrete or Masonry:
  - 1. TCNA B414: Cement mortar bed over vapor-retarder membrane. [Sandportland cement] [Standard] Water-cleanable epoxy grout.
  - 2. TCNA B415: Water-cleanable, tile-setting epoxy on waterproof membrane over cementitious backer units or fiber-cement backer board . Sand-portland cement Standard grout.
  - 3. TCNA B420: Thinset mortar on coated glass-mat, water-resistant gypsum backer board over vapor-retarder membrane . Sand-portland cement Standard grout.
  - 4. TCNA B421: Thinset mortar on waterproof membrane over solid backing. Sandportland cement Standard grout.
  - 5. TCNA B422: Thinset mortar on waterproof membrane with integrated bonding flange for bonded membranes. [Sand-portland cement] [Standard] grout.

END OF SECTION 093013

**CERAMIC TILING** 

# SECTION 095123 - ACOUSTICAL TILE CEILINGS

### 1.1 QUALITY ASSURANCE

A. Mockups for each form of construction.

### 1.2 SUSTAINABILITY REQUIREMENTS

- A. :
  - 1. Recycled content.
  - 2. Low-emitting adhesives.
  - 3. Low-emitting ceilings.

# 1.3 PERFORMANCE REQUIREMENTS

- A. Engineering design of seismic restraints by Contractor.
- B. Flame-Spread Index: Class A according to ASTM E1264.
- C. Smoke-Developed Index: 50 450 or less.

### 1.4 PRODUCTS

- A. Acoustical Tiles : Fire-Resistance Rated : See reflected ceiling plans .
  - 1. Type IV: Ultima High NRC Square Lay-in.
  - 2. Type:.
  - 3. Pattern: E (lightly textured) .
  - 4. LR: Not less than 0.90. .
  - 5. CAC: Not less than 30. .
  - 6. NRC: Not less than 0.60. .
  - 7. AC: 170. .
  - 8. Thickness: 3/4 inch .
  - 9. Modular Size: 24 in x 24 in .
- B. Metal Suspension System: .
  - 1. High-humidity finish.
  - 2. Direct Hung, Double Web , Fire Rated : Intermediate duty.
  - 3. Access: Upward and end pivoted or side pivoted.
  - 4. Attachment Devices: Postinstalled expansion Postinstalled bonded or power actuated.
  - 5. Seismic perimeter stabilizer bars, struts, and clips.
- C. Direct Attachment with Acoustical Tile Adhesive : .

### ACOUSTICAL TILE CEILINGS 095123 - 1

D. Metal Edge Moldings and Trim: Roll-formed sheet metal .

### 1.5 ERECTION TOLERANCES

- A. Main and Cross Runners: Level to within 1/8 inch in 12 feet(3mm in 3.6 m).
- B. Moldings and Trim: Level to within 1/8 inch in 12 feet(3mm in 3.6m).
- 1.6 FIELD QUALITY CONTROL
  - A. Special Inspection: Owner -engaged special inspector for seismic design.
  - B. Testing Agency: Owner engaged.

END OF SECTION 095123

# ACOUSTICAL TILE CEILINGS 095123 - 2

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# SECTION 096513 - RESILIENT BASE AND ACCESSORIES

# 1.1 SUSTAINABILITY REQUIREMENTS

A. :

- 1. Low-emitting adhesives.
- 2. Low-emitting flooring (stair accessories).

# 1.2 PRODUCTS

- A. Resilient Base: Thermoplastic rubber Vinyl, thermoplastic.
  - 1. Style and Location:
    - a. Straight: In areas with carpet .
    - b. Cove: In areas with resilient flooring .
  - 2. Minimum Thickness: 0.125 inch 0.080 inch .
  - 3. Height: 2-1/2 inches 4 inches 6 inches As indicated on Drawings.
  - 4. Outside Corners: Job formed or preformed.
  - 5. Inside Corners: Job formed or preformed.
- B. Resilient Accessories: Rubber Vinyl.
  - 1. Cap for cove carpet.
  - 2. Cap for cove resilient flooring.
  - 3. Carpet bar for tackless installations.
  - 4. Carpet edge for glue-down applications.
  - 5. Nosing for carpet.
  - 6. Nosing for resilient flooring.
  - 7. Reducer strip for resilient flooring.
  - 8. Joiner for tile and carpet.
  - 9. Transition strips.
- C. Installation Materials:
  - 1. Trowelable leveling and patching compounds.
  - 2. Adhesives.
  - 3. Stair-tread-nose filler.
  - 4. Metal edge strips.
  - 5. Floor polish.

END OF SECTION 096513

# SECTION 096519 - RESILIENT TILE FLOORING

### 1.1 SUSTAINABILITY REQUIREMENTS

Α. :

- 1. Low-emitting adhesives and chemical-bonding compounds.
- 2. Low-emitting sealants.
- 3. Low-emitting flooring.

### 1.2 PRODUCTS

- A. Solid Vinyl Floor Tile: Surface-decorated vinyl tile.
  - 1. Surface: Smooth Embossed.
  - 2. Thickness: 0.125 inch .
  - 3. Size: 12 by 12 inches .
  - 4. Seamless-Installation Method: Heat welded Chemically bonded .
- B. Rubber Floor Tile: Homogeneous rubber tile, solid color Homogeneous rubber tile, through mottled .
  - 1. Wearing Surface: Smooth Textured Molded pattern.
    - a. Molded-Pattern Figure: Raised squares .
  - 2. Thickness: 0.125 inch .
  - 3. Size: 12 by 12 inches 24 by 24 inches .
  - 4. Seamless-Installation Method: Heat welded Chemically bonded .
- C. Vinyl Composition Floor Tile: Solid-color Through-pattern Surface-pattern tile.
  - 1. Wearing Surface: Smooth Embossed.
  - 2. Thickness: 0.125 inch .
  - 3. Size: 12 by 12 inches.
- D. Resilient Terrazzo Floor Tile:
  - 1. Thickness: 1/8 inch .
  - 2. Size: 12 by 12 inches.
- E. Installation Materials:
  - 1. Trowelable leveling and patching compounds.
  - 2. Adhesives.
  - 3. Floor polish.
  - 4. Joint sealant for resilient terrazzo floor tile.
  - 5. Sealers and finish coats for resilient terrazzo floor tile.

END OF SECTION 096519

# RESILIENT TILE FLOORING 096519 - 1

### SECTION 099000 PAINTING AND COATING

### PART 1 - GENERAL

### 1.1 DESCRIPTION

This section includes materials and application of painting and coating systems for the following surfaces:

- A. Submerged metal.
- B. Exposed metal.
- C. Buried metal.
- D. Metal in contact with concrete.

This Section shall <u>NOT</u> be used for the coating of the interior and exterior surface of the Fire Storage tank, Refer to Section 099600, WATER TANK COATINGS.

- 1.2 RELATED WORK SPECIFIED ELSEWHERE
  - A. Specification Section 09 9540: POLYETHYLENE SHEET ENCASEMENT (AWWA C105)
- 1.3 SUBMITTALS
  - A. Submit shop drawings in accordance with Specification Section 013000: CONTRACTOR SUBMITTALS.
  - B. Submit manufacturer's data sheets showing the following information:
    - 1. Percent solids by volume.
    - 2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
    - 3. Recommended surface preparation.
    - 4. Recommended thinners.
    - 5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
    - 6. Application instructions including recommended equipment and temperature limitations.
    - 7. Curing requirements and instructions.

- C. Submit color swatches.
- D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.

### PART 2 – MATERIALS

### 2.1 PAINTING AND COATING SYSTEMS

The following index lists the various painting and coating systems by service and generic type:

NO	TITLE	GENERIC COATING
7	SUBMERGED METAL COATING SYSTEMS	Ероху
10	EXPOSED METAL – CORROSIVE ENVIRONMENT	High-Build Epoxy (two-coat system) with polyurethane topcoat
21	BURIED METAL	Coal-tar epoxy

### PAINT COATINGS SYSTEM INDEX

These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

### 2.2 SUBMERGED METAL COATING SYSTEMS

SYSTEM NO. 7- Submerged Metal, Potable Water (Epoxy).

Type: Epoxy.

Service Conditions: For use with structures, piping, or equipment immersed in potable water.

Surface Preparation: SSPC SP-10.

Coating System: Apply two or more coats of Tnemec Series N140 Carboline Hi-Gard 891, Ameron 395, or equal; 16 mils total. Color of topcoat: white.

### 2.3 EXPOSED METAL COATING SYSTEMS

SYSTEM NO. 10-Exposed Metal, Corrosive Environment:

Type: High-build epoxy intermediate coat having a minimum volume solids of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

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Service Conditions: For use with metal structures or pipes subjected to water condensation; chemical fumes, such as hydrogen sulfide; salt spray; and chemical contact.

Surface Preparation: SSPC SP-10.

Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 2.5 to 3.5 mils. Products: Tnemec 90-97, Carboline 11HS; Ameron 9HS, or approved equal.

Intermediate Coat: Tnemec 104; Carboline 888 or 890, Ameron 385, or equal; 5.0 to 7.0 dry mils.

Finish Coat: Two-component pigmented aliphatic or acrylic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec 290; Ameron 450 HS, Carboline 134 HG or equal.

### 2.4 BURIED METAL COATING SYSTEMS

SYSTEM NO. 21-Buried Metal

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D 2697)

Service Conditions: buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

Surface Preparation: SSPC SP-10

Coating System: Apply three or more coats of Ameron 400, Tnemec 104 HS or 80, Carboline 890 LT, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

### 2.5 ABRASIVES FOR SURFACE PREPARATION

- A. Abrasives used for preparation of iron and steel surfaces shall be one of the following:
  - 1. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.
  - 2. 20 to 40 mesh garnet.
  - 3. Crushed iron slag, 100% retained on No. 80 mesh.
  - 4. SAE Grade G-40 or G-50 iron or steel grit.
- B. Abrasives used for preparation of copper and aluminum surfaces shall be one of the following:
  - 1. Crushed slag, 80 to 100 mesh.
  - 2. Very fine silica sand, 80 to 100 mesh.

PAINTING AND COATING 099000-3 C. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

### 2.6 ORGANIC ZINC PRIMER FOR FIELD TOUCH-UP AND SHOP COATING

- A. Organic zinc coating system shall have a minimum zinc content of 14 pounds per gallon. Coating shall be of the two- or three-component converted epoxy, epoxy phenolic, or urethane type. Products: Tnemec 90-97, Ameron 68HS, or equal; applied to a minimum dry-film thickness of 3 mils. Organic zinc primer shall be manufactured by the prime coat manufacturer.
- B. Where shop-applied inorganic zinc primers cannot be used because of volatile organic compound (VOC) regulations, the above organic zinc primers described in System No. 18 may be substituted for the specified inorganic zinc primers.

### PART 3 - EXECUTION

### 3.1 WEATHER CONDITIONS

- A. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than 5 degrees F above the dew point.
- B. Do not apply paint when the relative humidity is above 85% or the temperature is above 90 degrees F.
- C. Do not paint when temperature of metal to be painted is above 120 degrees F.
- D. Do not apply alkyd silicone aluminum, silicone acrylic or inorganic zinc paints if air or surface temperature is below 40 degrees F or expected to be below 40 degrees F within 24 hours.
- E. Do not apply epoxy acrylic latex and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60 degrees F or expected to drop below 60 degrees F in 24 hours.

### 3.2 SURFACE PREPARATION

- A. Do not sandblast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove all sharp edges, burrs, and weld spatter. Do not sandblast epoxy-or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.
- B. Surface preparation shall conform with the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3

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White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10

- C. Wherever the words "solvent cleaning," "hand tool cleaning," "wire brushing," or "blast cleaning" or similar words are used in these specifications or in paint manufacturer's specifications, they shall be understood to refer to the applicable SSPC (Steel Structure Painting Council, Surface Preparation Specifications, ANSI A159.1) specifications listed above.
- D. Dust blasting is defined as cleaning the surface through the use of very fine abrasives, such as siliceous or mineral abrasives, 80 to 100 mesh. Apply a fine etch to the metal surface to clean the surface of any contamination or oxide.
- E. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before sandblasting.
- F. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3.
- G. Neutralize welds with a chemical solvent that is compatible with the specified coating materials. Use clean cloths and chemical solvent. Wipe dry with clean cloths. Do not leave a residue on the cleaned surfaces.

### 3.3 ABRASIVE BLAST CLEANING

- A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.
- B. After blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.
- C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.
- D. During sandblast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

### 3.4 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

- A. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.
- B. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.
- C. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.
- D. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

### 3.5 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

- A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.
- B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that may have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.
- C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.
- D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.
- E. Use repair procedures on damaged primer which protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

- F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.
- G. Surfaces that are shop primed with inorganic zinc primers shall receive a field touch-up of organic zinc primer to cover all scratches or abraded areas.
- H. Other surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

### 3.6 PAINTING SYSTEMS

- A. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.
- B. Deliver paints to the jobsite in the original, unopened containers.

### 3.7 PAINT MIXING

Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

### 3.8 PROCEDURES FOR THE APPLICATION OF COATINGS

- A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.
- B. Stir, strain, and keep coating materials at a uniform consistency during application. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.
- C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.

- D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.
- E. Apply coating systems to the specified minimum dry-film thicknesses as measured from above the peaks of the surface profile.
- F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.
- G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. The brush coat shall be done prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

### 3.9 SURFACES NOT TO BE COATED

Do not paint the following surfaces unless otherwise noted on the drawings or in other specification sections. Protect during the painting of adjacent areas:

- A. Concrete walkways.
- B. Mortar-coated pipe and fittings.
- C. Stainless steel.
- D. Metal letters.
- E. Glass.
- F. Roofings.
- G. Fencing.
- H. Copper tubing, red brass piping, and PVC piping except where such piping occurs in areas where the walls are painted, or required for color coding.
- I. Electrical fixtures except for factory coatings.
- J. Nameplates.
- K. Grease fittings.
- L. Brass and copper, submerged.
- M. Buried pipe, unless specifically required in the piping specifications.

### PAINTING AND COATING 099000-8

N. Aluminum handrail, stairs, and grating.

### 3.10 PROTECTION OF SURFACES NOT TO BE PAINTED

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

### 3.11 SURFACES TO BE COATED

Coat surfaces as described below:

- A. Coat mechanical equipment as described in the various mechanical equipment specifications. Color shall match the color of the connecting piping.
- B. Coat aboveground and exposed piping or piping in vaults and structures as described in the various piping specifications. Color shall be as selected by the OWNER.
- C. Coat valves as described in the various valve specifications. Aboveground valves, or valves in vaults and structures, shall match the color of the connecting piping.
- D. Coat aluminum surfaces in contact with concrete per System No. 51.
- E. Coat buried flanges, nuts and bolts, valves, flexible pipe couplings, exposed rebar in thrust blocks, and valve boxes per System No. 21.

### 3.12 DRY-FILM THICKNESS TESTING

Measure coating thickness specified for metal and concrete surfaces with a calibrated magnetic-type dry-film thickness gauge. Test the finish coat (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide detector as manufactured by Tinker and Rasor or K-D Bird Dog. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer. Check each coat for the correct dry-film thickness. Do not measure within eight hours after application of the coating.

Make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three gauge readings for each spot measurement of either the substrate or the paint. Move the probe a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low gauge reading that cannot be repeated consistently. Take the average (mean) of the three gauge readings as the spot measurement. The average of five spot measurements for each such 100 square foot area shall not be less than the specified thickness. No single spot measurement in any 100 square foot area shall be less than 80%, nor more than 120%, of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount.

### 3.13 REPAIR OF IMPROPERLY COATED SURFACES

If the item has an improper finish color or insufficient film thickness, sandblast as required, and clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

### PART 4 – PAYMENT

Costs for the work in this section shall not be paid for separately, but shall be considered incidental to the contract work to be accomplished.

END OF SECTION 099000

### SECTION 099113 - EXTERIOR PAINTING

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on [exterior substrates.] [the following exterior substrates:]
  - 1. Steel and iron.

### 1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. <a><br/>
  </a>
  Click here to find, evaluate, and insert list of manufacturers and products.>
- B. Products: Subject to compliance with requirements, [provide product] [provide one of the products] [available products that may be incorporated into the Work include, but are not limited to products] listed in the Exterior Painting Schedule for the paint category indicated.
- 2.2 PAINT, GENERAL
  - A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
  - B. Material Compatibility:
    - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
    - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
  - C. Colors: [As selected by Architect from manufacturer's full range] Match Architect's samples <Insert requirements>.
    - 1. [Twenty] <Insert number> percent of surface area will be painted with deep tones.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Fiber-Cement Board: 12 percent.
  - 3. Masonry (Clay and CMUs): 12 percent.
  - 4. Wood: 15 percent.

### EXTERIOR PAINTING 099113 - 2

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- 5. Portland Cement Plaster: 12 percent.
- 6. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. 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.

### 3.4 CLEANING AND PROTECTION

- A. 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.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.5 EXTERIOR PAINTING SCHEDULE

- A. Steel and Iron Substrates:
  - 1. Water-Based Light Industrial Coating System [MPI EXT 5.1C] :

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- a. Prime Coat: Primer, alkyd, anti-corrosive for metal [, MPI #79].
  - 1) <Insert manufacturer's name; product name or designation>.
- b. Prime Coat: Shop primer specified in Section where substrate is specified.
- c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- d. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3) [, **MPI #161**].
  - 1) <Insert manufacturer's name; product name or designation>.
- e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5) [, MPI #163].
  - 1) <Insert manufacturer's name; product name or designation>.
- f. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6) [, MPI #164].
  - 1) < Insert manufacturer's name; product name or designation>.
- 2. Alkyd System :
  - a. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
  - b. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 1) [, MPI #8].
    - 1) <Insert manufacturer's name; product name or designation>.
  - c. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5) [, MPI #94].
    1) <Insert manufacturer's name; product name or designation>.
  - d. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6) [, MPI #9].
    - 1) <Insert manufacturer's name; product name or designation>.

END OF SECTION 099113

EXTERIOR PAINTING

# SECTION 099123 - INTERIOR PAINTING

### 1.1 SUSTAINABILITY REQUIREMENTS

- Α. :
  - 1. Low-emitting paints and coatings.
  - 2. Product declarations.

# 1.2 SUMMARY

- A. Primers.
- B. Finish coatings.
- C. Floor sealers and paints.
- D. Dry-fall coatings.

### 1.3 QUALITY ASSURANCE

- A. Mockups for each color and finish.
- 1.4 FIELD QUALITY CONTROL
  - A. Testing Agency: Owner engaged.
- 1.5 INTERIOR PAINTING SCHEDULE
  - A. Concrete Substrates, Nontraffic Surfaces:
    - 1. Latex system.
    - 2. Latex over latex aggregate system.
    - 3. Latex aggregate system.
    - 4. Institutional low-odor/VOC latex system.
    - 5. High-performance architectural latex system.
    - 6. Water-based light-industrial coating system.
    - 7. Concrete stain system.
  - B. Concrete Substrates, Traffic Surfaces:
    - 1. Latex floor enamel system.
    - 2. Alkyd floor enamel system.
    - 3. Concrete stain system.
    - 4. Water-based concrete floor sealer system.
    - 5. Solvent-based concrete floor sealer system.

- C. Cement Board Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- D. Clay Masonry Substrates:
  - 1. Latex system.
  - 2. Latex aggregate system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Water-based light-industrial coating system.
  - 6. Alkyd system.
- E. CMU Substrates:
  - 1. Latex system.
  - 2. Latex aggregate system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Water-based light-industrial coating system.
  - 6. Alkyd system.
- F. Steel Substrates:
  - 1. Latex system, alkyd primer.
  - 2. Latex over shop-applied quick-drying shop primer system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Water-based light-industrial coating system.
  - 6. Water-based light-industrial coating system over epoxy primer system.
  - 7. Water-based dry-fall system.
  - 8. Water-based dry fall over shop-applied quick-drying shop primer system.
  - 9. Alkyd system.
  - 10. Alkyd over surface-tolerant primer system.
  - 11. Quick-dry enamel system
  - 12. Alkyd dry-fall system.
  - 13. Alkyd dry fall over quick-drying primer system.
  - 14. Aluminum paint system.
- G. Galvanized-Metal Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Water-based dry-fall system.
  - 6. Alkyd over cementitious primer system.

- 7. Alkyd dry-fall system (cementitious primer).
- 8. Aluminum paint system.
- H. Aluminum (Not Anodized or Otherwise Coated) Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- I. Copper Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- J. Stainless Steel Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- K. Exposed Wood Framing:
  - 1. Latex over latex primer system.
  - 2. Latex over alkyd primer system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Alkyd system.
- L. Finish Carpentry: Doors .
  - 1. Latex over latex primer system.
  - 2. Latex over alkyd primer system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Water-based light-industrial coating system.
  - 6. Water-based alkyd system.
  - 7. Alkyd system.
- M. Architectural Woodwork: casework.
  - 1. Latex over latex primer system.
  - 2. Latex over alkyd primer system.
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.

- 5. Water-based light-industrial coating system.
- 6. Alkyd system.
- N. Wood Traffic Surfaces: Floors .
  - 1. Latex porch and floor enamel system.
  - 2. Alkyd floor enamel system.
- O. Wood Shingles and Shakes:
  - 1. Latex over latex primer system.
  - 2. Latex over alkyd primer system.
  - 3. Alkyd system.
- P. Fiberglass Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- Q. Plastic Substrates:
  - 1. Latex system.
  - 2. Institutional low-odor/VOC latex system.
  - 3. High-performance architectural latex system.
  - 4. Water-based light-industrial coating system.
  - 5. Alkyd system.
- R. Spray-Textured Ceiling Substrates:
  - 1. Latex, flat system.
  - 2. Latex system.
  - 3. Latex over alkyd sealer system.
  - 4. Alkyd, flat system.
  - 5. Alkyd over alkyd sealer system.
- S. Gypsum Board and Plaster Substrates:
  - 1. Latex over latex sealer system.
  - 2. Latex over alkyd primer system (for plaster only).
  - 3. Institutional low-odor/VOC latex system.
  - 4. High-performance architectural latex system.
  - 5. Water-based light-industrial coating system.
  - 6. Alkyd over latex sealer system.
- T. Acoustic Panels and Tiles:
  - 1. Latex, flat system.
  - 2. Latex over alkyd primer system.

- 3. Institutional low-odor/VOC latex system.
- High-performance architectural latex system. 4.
- 5. Alkyd, flat system.
- U. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.
  - 1. Latex system.
  - Institutional low-odor/VOC latex system. 2.
  - 3. Alkyd system.
  - Aluminum paint system. 4.
- V. **Bituminous-Coated Substrates:** 
  - 1. Latex system.
  - 2. Alkyd system.
  - 3. Aluminum paint system.

END OF SECTION 099123

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# **INTERIOR PAINTING**

SECTION 099540 POLYETHYLENE SHEET ENCASEMENT (AWWA C105)

PART 1 – GENERAL

### 1.1 DESCRIPTION

This section includes materials and installation of a polyethylene sheet encasement for buried ductile iron pipe, fittings, and valves.

### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Specification Section 33 1000: WATER UTILITIES
- B. Specification Section 33 1500: STEEL PIPING

### 1.3 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300: CONTRACTOR SUBMITTALS.
- B. Submit manufacturer's catalog literature and product data sheets describing the physical, chemical, and electrical properties of the encasement material.

### PART 2 – PRODUCTS

### 2.1 POLYETHYLENE WRAP

The encasement shall consist of a polyethylene wrap at least 8 mils thickness conforming to AWWA C105. Color: Black.

### 2.2 PLASTIC ADHESIVE TAPE

Tape shall be Calpico Polyvinyl Tape, Polyken 900, Scotchwrap 50, or equal.

### PART 3 – EXECUTION

### 3.1 APPLYING SHEET COATING TO BURIED PIPING AND FITTINGS

- A. Apply wrapping per AWWA C105.
- B. Apply a single wrapping.
- C. Overlap adjoining polyethylene tube coatings a minimum of 1 foot and wrap prior to placing concrete anchors, collars, supports, or thrust blocks. Hand wrap the
## Church Rock Phase II Factory | Church Rock, NM

polyethylene sheet, apply two layers, and secure in place with 2-inch-wide polyethylene adhesive tape.

#### 3.2 APPLYING SHEET COATING TO BURIED VALVES

Wrap with a flat sheet of polyethylene. Place the sheet under the valve and the flanges or joints with the connecting pipe and fold in half. Extend the sheet to the valve stem and secure the sheet in place with 2-inch-wide plastic adhesive tape. Apply a second layer and secure with tape. Secure the sheets with tape around the valve stem below the operating nut and around the barrel of the connecting pipe to prevent the entrance of soil. Pour concrete anchor and support blocks after the wrap has been placed.

#### 3.3 APPLYING SHEET COATING TO BURIED FLEXIBLE PIPE COUPLINGS

Apply two layers or wraps around the coupling. Overlap the adjoining pipe or fitting a minimum of 1 foot and secure in place with tape. Apply tape around the entire circumference of the overlapped section on the adjoining pipe or fitting.

#### 3.4 REPAIR OF POLYETHYLENE MATERIAL

Repair polyethylene material that is damaged during installation. Use polyethylene sheet, place over damaged or torn area, and secure in place with 2-inch-wide plastic adhesive tape.

#### PART 4 – PAYMENT

Payment for the work in this section shall not be paid for separately, but shall be included as part of the unit price cost for piping. No additional compensation will be made.

END OF SECTION 099540

#### SECTION 099550 COLD APPLIED WAX TAPE COATING

#### PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

The work of this Section includes materials and application of a three part, cold applied wax tape coating system for buried piping. The coating system shall be in accordance with AWWA C217 and as modified herein.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

Specification Section 09 9540: POLYETHYLENE SHEET ENCASEMENT (AWWA C105)

#### 1.3 SUBMITTALS

The following shall be submitted in compliance with Specification Section 01300: CONTRACTOR SUBMITTALS:

- A. Manufacturer's catalog data sheets.
- B. Manufacturer's application instructions.

#### PART 2 - PRODUCTS

#### 2.1 PRIMER

A. Primer shall be a blend of petroleum, plasticizer, and corrosion inhibitors having a paste-like consistency. The primer shall have the following properties:

1. Pour Point	100°F to 110°F
2. Flash Point	350°
3. Coverage	1 gallon/100 square feet

B. Primer shall be Trenton Wax Tape Primer, Dense Paste Primer, or equal.

#### 2.2 WAX TAPE

A. Wax tape shall consist of a synthetic-fiber felt, saturated with a blend of microcrystalline wax, petroleum, plasticizer, and corrosion inhibitors, forming a tape coating that is easily formable over irregular surfaces. The tape shall have the following properties:

1. Saturant Pour Point	115°F to 120°F
2. Thickness	50 to 70 mils
<ol><li>Tape Width</li></ol>	6 inches

- 4. Dielectric Strength 100 volts/mil
- B. Wax tape shall be Trenton No. 1 Wax Tape, Denso "Densyl Tape", or equal.

#### 2.3 PLASTIC WRAPPER

A. Wrapper shall be a polyvinylidene chloride plastic with three 50-gauge plies wound together as a single sheet. The wrapper shall have the following properties:

1. Color	Clear
2. Thickness	1.5 mils
3. Tape Width	6 inches

- B. Plastic wrapper shall be Trenton Poly-Ply, Denso Tape PVC Self Adhesive, or equal.
- 2.4 POLYETHYLENE SHEET COATING See Specification Section 09 9540: POLYETHYLENE SHEET ENCASEMENT (AWWA C105).

#### PART 3 - EXECUTION

- 3.1 WAX TAPE COATING APPLICATION
  - A. Surfaces shall be clean and free of all dirt, grease, water, and other foreign material prior to the application of the primer and wax tape.
  - B. Primer shall be applied by hand or brush to all surfaces of the pipe, fitting, flanges, and bolts to be wrapped by wax tape. The primer shall be worked into all crevices, around bolts and nuts, into the threads, and shall completely cover all exposed metal surfaces. The primer shall be extended beyond the indicated limits of application a minimum of 3 inches onto adjacent surfaces of the piping.
  - C. Wax tape shall be applied immediately after the primer application. The tape shall be worked into the crevices around the fitting or flanges. Short lengths of tape shall be cut, placed over each bolt head and nut, and worked into the crevices. The wax tape shall be wrapped spirally around the pipe and across the fitting or flanges to a minimum of 6 inches beyond each side of the item being installed. A minimum overlap of 55 percent of the tape width shall be used.
  - D. The tape shall be worked into the crevices and contours of irregularly shaped surfaces and smoothed out so that there is a continuous protective layer with no voids or spaces under the tape.
  - E. The completed wax tape coating installation shall be overlapped with the plastic wrapping material. Wrap spirally around the pipe and across the fitting or flanges.
    Use a minimum overlap of 55 percent of the tape width and apply two layers or applications of overwrap. Plastic wrapper shall be secured to pipe with adhesive tape.

#### 3.2 POLYETHYLENE ENCASEMENT

Completed wax tape coating system shall be wrapped with polyethylene sheet per Specification Section 09 9540: POLYETHYLENE SHEET ENCASEMENT (AWWA C105) and secured around the adjacent pipe circumference with adhesive tape.

#### PART 4 – MEASUREMENT AND PAYMENT

Payment for the work in this section shall not be paid for separately, but shall be included in the various items of work to which it pertains and no additional compensation will be made therefor.

END OF SECTION 099550

## SECTION 099600 WATER TANK COATINGS

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Interior and exterior coatings, and insulation, of steel water reservoirs.
- B. Coating of exposed piping.
- C. All coating testing.

#### 1.2 REFERENCES

- A. Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2: SSPC Specifications".
- B. American Standard Scheme for the Identification of Piping Systems, Standard A13\_1.
- C. National Sanitation Foundation: NSF Specifications.
- D. AWWA D102-97: Coating Steel Water Storage Tanks

#### 1.3 RELATED SECTIONS

A. SECTION 33 1613 – FIRE PROTECTION AND DOMESTIC STORAGE TANK

#### 1.4 SUBMITTAL DATA

- A. Submittals shall be made in accordance with Section 01 3000 Administrative Requirements of the Project Manual.
- B. Manufacturer's product specific application instructions.
- C. Schedule of products to be used and mil thickness to be applied in accordance with manufacturer's recommendations.
- D. Manufacturer's standard color selection chart.
- E. Applicator's qualifications and manufacturer's training certifications.

#### 1.5 DELIVERY AND HANDLING

- A. Coating materials shall be delivered to the site in the original, sealed containers.
- B. Containers shall be opened or used only after Owner's or Engineer's inspection of contents.

## PART 2 – PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Tnemec:
  - 1. Tank Interior Primer Hydro-Zinc Series 91-H2O
  - 2. Tank Interior (Intermediate and Final Coat) Pota-pox Series 20
  - 3. Tank Exterior Primer Series 66
  - 4. Tank Exterior Finish Polyurethane Series 1074U Endura-Shield II
  - 5. Piping Series N69 Hi Build Epoxoline II B. Engineer approved equivalent.

## 2.2 PAINT SYSTEMS

- A. Tank Outside Coating System (OCS):
  - 1. Two coats consisting of one coat of primer and one coat of Exterior Finish.
  - 2. Materials:
    - a. The first and intermediate coats shall be tinted to provide color contrast between coats.
  - 3. Thickness: dry film thickness, in mils of the paint shall be:
    - a. 1st coat: 4.0 5.0 mils
    - b. Intermediate coat: 4.0 5.0 mils
    - c. Total system: 8.0 10.0 mils
  - 4. Color: selected by Owner/Architect from paint system manufacture's standard colors.
  - 5. AWWA Paint System Designation: OCS-5-S
- B. Prefabricated Vertical Standing Seam Panel System.
  - 1. For insulation of tank walls.
  - 2. Materials:
    - a. Per NFPA 22 following installation of outside primer and intermediate coats
    - b. ASTM B-209, 3105-H14, or 1100-H14
    - c. Embossed polyester painted aluminum, 0.024-inch thickness, 24inches wide by height of sidewall
    - d. Laminated to insulation with non-flammable contact adhesive e. 2.5-inch thick polyisocyanurate foam
  - 3. Installation:

- a. Attached to ¼-inch stainless steel cables places around tank on 2foot centers with bottom cable 18-inches from the bottom and top cable 12- inches from the rim.
- b. Pull tight and tension with 3/8-inch x 6-inch stainless steel turnbuckles.
- C. Standing Seam Panel System
  - 1. For insulation of tank roof.
  - 2. Materials:
    - a. Per NFPA 22 following installation of outside primer and intermediate coats
    - b. Radial design
    - c. 0.024-inch thick stucco embossed polyester painted aluminum, 3feet wide at heel and necking down in a gored fashion
  - 3. Installation:
    - a. Fasten standing seam to 3/8-inch mild steel round bar, tack welded to tank roof every 5-feet. Round bar shall be on 3-foot circular centers.
    - b. Run seams perpendicular to round bar and secure at each intersection with ½-inch wide by 0.020-inch stainless straps, looped around the bar. Fold end into the double folded standing seam, in the slope direction.
    - c. Fit top rim of tank with 1  $\frac{1}{2}$ -inch x 7-inch x 1/8-inch thick aluminum extrusion, bolted in place by  $\frac{1}{4}$ -inc thick x 1  $\frac{1}{2}$ -inch stainless steel bolts, with the 1  $\frac{1}{2}$  inch leg extended out and set at a height equal to the roof insulation thickness.
- D. Tank Inside Coating System (ICS) :
  - 1. Used for any surfaces in contact with water or exposed to water vapor
  - 2. Color: white
  - 3. Materials:
    - a. Suitable for potable water service, evaluated for long-term fresh water resistance and demonstrated satisfactory service in fresh water for at least 18 months; approved by NSF for potable water use.
    - b. Packaging: packaged in containers of suitable size so that one container of each component is used in mixing the paint to the proper proportions.
  - 4. Thickness: the dry film thickness, in mils of the paint shall be:
    - a. Primer: 3.0 5.0
    - b. Finish coats: 4.0 6.0 per coat, dry film thickness to be checked between coats
    - c. Total system: 11.0 15.0
- E. AWWA Paint System Designation: ICS-2-W

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Church Rock Phase II Factory | Church Rock, NM

- 1. First coat: 4.0 to 6.0 mils DFT.
- 2. Second coat: 4.0 to 6.0 mils DFT.
- 3. Total minimum mils DFT shall be 8.0 mils.
- 4. AWWA Paint System Designation: ICS-2-W.

#### PART 3 - EXECUTION

#### 3.1 SURFACE PREPARATION

- A. Tank Interior Surfaces:
  - 1. New Tank:
    - a. The interior surfaces of new tanks shall be cleaned by SSPC-SP10, "Near White Blast Cleaning".
    - b. All mill scale and rust shall be removed.
- B. Tank Exterior Surfaces:
  - 1. New Tank:
    - a. For new tanks, exterior surfaces shall be cleaned according to SSPC-SP6, "Commercial Blast Cleaning".
    - b. All mill scale and rust shall be removed.

#### 3.2 FIELD WELDS AND ABRASIONS

- A. All weld areas and all areas on which the shop paint has been damaged shall be cleaned after field welding is completed.
- B. Exterior surfaces: exterior surfaces shall be cleaned by SSPC-SP6, "Commercial Blast Cleaning" except that CCPC-SP3, "Power Tool Cleaning" may be used when this is a satisfactory method of surface preparation for the primer to be applied.
- C. Interior surfaces: interior surfaces shall be cleaned by SSPC-SP10, "Near White Blast Cleaning".

#### 3.3 APPLICATION

- A. The requirements of SSPC-PA1 shall be followed with regard to storage of paint and thinner, mixing, thinning, painting contact surfaces, application of shop and field paint and drying of painted steel.
- B. Timing of Application
  - 1. Paint materials shall be applied immediately after surface preparation (and wash priming when required), before any surface rusting occurs or any dust or soil has accumulated.

- 2. Shop-applied prime coats may be applied by any method that attains an acceptable coating.
- 3. Field priming shall be performed by brushing or spraying tank interior surfaces and by brushing, rolling, or spraying tank exterior surfaces.
- 4. When plates have been shop primed, all weld areas on which shop primer has been damaged shall be cleaned again in the field and primed with the same primer, applied to the same dry film thickness as the shop coat.
- C. Tank Exterior and Interior Surface Painting:
  - 1. Exterior surfaces shall be painted by spraying or rolling.
  - 2. Interior surfaces shall be painted by spraying.
  - 3. Conventional spraying, airless spraying and hot spraying are acceptable methods.
- D. Interior Coating Standard:
  - 1. The interior coating shall be applied to give a "pinhole-free" surface over the entire interior tank surface, as defined by NACE Standard RP0188-88.
  - 2. The term "pinhole-free" means absolutely continuous.
- E. Coating System Application on Other Surfaces:
  - 1. Brush-apply one coat of the interior coating system at all of the tank's welded connections, edges and inside angles.
  - 2. This "striped" application shall be in addition to the DFT specified and shall be performed prior to the first spray application of the coating system.

#### 3.4 TESTING

- A. Paint Film Thickness:
  - 1. Paint film thickness shall be verified by measuring the wet film thickness of each coat as it is applied and the dry film thickness of the entire system.
  - 2. When film thicknesses are indicated without an indicated tolerance, the allowable gauge tolerance shall be twice the indicated accuracy of the measurement; that is, for a measurement with an indicated accuracy of +/- 0.25 mil, the allowable tolerance is +/- 0.5 mil.
- B. Wet Film Thickness:
  - 1. The wet film thickness shall be measured with a gauge that will measure the wet film thickness within an accuracy of +/- 0.5 mil.
  - 2. A wet film thickness measurement shall be made for each 100 sq. ft. of surface painted.

- C. Dry Film Thickness(DFT):
  - 1. The dry film thickness shall be measured in accordance with SSPC-PA2 with a magnetic gauge that will measure the dry film thickness within an accuracy of +/- 0.25 mil.
  - 2. As many dry film thickness measurements as are feasible shall be made so that there is a minimum of one measurement for each 100 sq. ft. of surface painted.
  - 3. If an Owner's representative is present at the site, the dry film thickness measurements shall be made while surfaces are accessible at locations selected by the Owner's representative.
  - 4. Extensive re-rigging after paint has dried so dry film thickness measurements can be made is not required, provided that:
    - a. The number of measurements made is equivalent to one for each 100 sq. ft. of surface painted.
    - b. The location of the measurements is reasonably distributed.
    - c. All measurements taken meet or exceed the specified minimum dry film thickness.
  - 5. Additional coats shall be applied in order to attain the minimum dry film thickness specified for the painted system.
- D. Holiday Testing Interior Surfaces:
  - 1. For the inside paint system, 100% of the painted surfaces below the overflow shall be tested with a wet-sponge, low voltage holiday detector after the paint has cured to the extent recommended by paint manufacturer.
  - 2. The sponge shall be kept saturated with an electrolyte (5% NaCl) and a surfactant (2% household detergent).
  - 3. During testing the wet sponge shall be kept in continuous contact with the painted surface.
  - 4. Locations where holidays are detected shall be marked for repair and retested after repairs have been completed.

#### 3.5 COATINGS CERTIFICATION

- A. Interior and exterior coatings shall be certified by an independent National Association of Corrosion Engineers (NACE)-certified and -accredited inspector, and acceptable to the Owner.
- B. NACE Certified Coating Inspector Obligations:
  - 1. The NACE-certified coatings inspector shall make all required site inspections and tests at the tank fabrication shop and the project site in order that he may certify the coatings system was constructed in compliance with the coating manufacturer's recommendations, this specification, and the applicable standards referenced herein.

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- 2. Tests performed at the project site will be scheduled in order that the owner's representative on the project is present during all testing.
- C. Test Report:
  - 1. A test report shall be prepared and submitted to the Owner at the conclusion of dry film thickness and indicating:
    - a. The film thickness gauge used.
    - b. The locations where tests were made.
    - c. The dry film thickness at each location.
    - d. The name of the person making the tests.
    - e. The names of the persons who are representing the Contractor and the Owner and who are witnessing the test.
  - 2. The test report shall be certified by the NACE certified coating inspector, indicating compliance with this specification.
  - 3. The report will also include the dates and times of inspections made at the tank fabrication site for surface preparation.

## PART 4 – MEASUREMENT AND PAYMENT

 A. Payment for the work of this section shall be part of the work of SECTION 33 1613 - SURFACE WATER-STORAGE TANK as shown on the Drawings. Payment shall include coating testing and inspection and eleven month anniversary inspection.

END OF SECTION 099600

## SECTION 10-1400 SIGNAGE

## PART 1 GENERAL

## **1.1 SECTION INCLUDES**

A. Interior and Exterior Signage

## **1.2 QUALITY ASSURANCE**

- A. Single Source Requirements: Obtain all products in this section from a single supplier. Supplier must fabricate and install.
- B. Fabricator/Installer shall have five years' experience fabricating/installing products of similar type and scope as those specified in this section.

## **1.3 REFERENCES**

- A. Regulatory Requirements: All products shall meet/follow these requirements/codes:
- 1. 2010 ADA Standards for Accessible Design
- 2. Building Codes (for example IBC, IFC) as specified in the Permitted Plans

## **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Prior to final Design Drawings, provide samples (Qty 3) of Exterior Sign Paint, Interior Signage Substrate.
- C. Design Drawings showing layout, profiles, and product components, including dimensions, fonts, and mounting methods. Drawings shall contain elevations and section details for all work in this section where applicable.
- D. Sign Location Plan
- E. Message Schedule

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Submit under provisions of Section 01300.
- B. Signage may be supplied early to meet lead-time requirements to avoid construction delays. General Contractor/Owner to inspect and sign for receipt of products (whether stored on site or in other approved area)
- C. Deliver products in unopened, undamaged containers with labels clearly identifying product name.
- D. Protect Stored Products from weather, temperature, and other harmful conditions in accordance with manufacturer's instructions.
- E. Protect materials during handling and installation to prevent damage.

## **1.6 WARRANTY**

A. Warrantees must meet these minimum requirements

- 1. Interior Room Signs-Warranted for the life of the building.
- 2. Dimensional Letters-Warranted for the life of the building.
- 3. Cut Vinyl/Lamination Applications-Warranted for 5-7 years (mirror the 3M vinyl/Laminate Warranty)
- 4. Direct Print Applications-Warranted for 15 years Interior and 3-5 years Exterior with 3M's 8510/8520 Laminate applied.

# PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. Listed by Products.
- B. Substitutions permitted with approved Request for Substitution.

# 2.2 INTERIOR AND EXTERIOR ROOM SIGNS, RESTROOM SIGNS, LOCKER ROOM SIGNS, AND TACTILE EXIT SIGNS

A. Product: Century Sign Builders, Basic Sign System

(https://www.csbsigns.com/project/basic-sign-system/)

- 1. Sign Types: Refer to sign type in design drawings (RS, RR, LR, MR, EE, MO)
- a. Base Material Product: Romark 1/8<sup>th</sup> thick ADA Alternative, matte non-glare single-ply modified acrylic.
- b. Base Material Color: Refer to sign type drawings.
- c. Tactile Raised Lettering and Symbols Material Product: Romark, 1/32<sup>th</sup> ADA Alternative matte non-glare single- ply modified acrylic.
- d. Tactile Raised Lettering and Symbols Color: Refer to sign type drawings.
- e. Tactile Raised Lettering Font: Refer to sign type drawings.
- f. Tactile raised Lettering and Symbols fabrication method: Tactile lettering and symbols shall be formed using rotary engraving method and bonded to sign base material using 3M Scotch 467HP adhesive. Text, numbers and symbols must have 1/32" return cut to 22 degree angle. Text, numbers and symbols must be constructed with materials having embedded coloration that is the final approved color for the signs. Products with painted or otherwise applied coloration method are not acceptable.
- g. Braille Method: Braille must be constructed using the Edgerton Grade 2 Braille System using clear Raster beads
- 2. Sign Installation: Signs shall be mounted using double-sided vinyl foam tape (1/16" thickness) and silicon adhesive

# 2.3 EVACUATION DIAGRAM LIFE SAFETY SIGN

A. Product: Century Sign Builders, Basic Sign System

(https://www.csbsigns.com/project/basic-sign-system/)

- 1. Sign Types: Refer to sign type in design drawings (EV)
- a. Base Material Product: Romark 1/8<sup>th</sup> thick ADA Alternative, matte non-glare single-ply modified acrylic.

- b. Base Material Color: Refer to sign type drawings.
- c. Printed Graphics Fabrication Method: Direct to Substrate Flat Bed UV Printing Process
- 2. Sign Installation: Signs shall be mounted using double-sided vinyl foam tape (1/16" thickness) and silicon adhesive
- 3. Map Design: Sign Shop to design map graphics based on life safety plans provided by architect. Design shall be approved by architect and fire marshal.

# 2.4 ALUMINUM EXTERIOR SIGNS

- A. Product: Aluminum Sign Panel
- 1. Sign Types: Refer to sign type in design drawings (FDC, BI)
- a. Base Material: .080" Aluminum
- Base Material Cladding Product: 3M Diamond Grad DG3 Reflective Vinyl Sheeting 4090 White
- c. Paint Product: MAP® (Matthews Acrylic Polyurethane) UV resistant acrylic polyurethane paint
- d. Paint finish: Satin sheen finish
- e. Paint color: Refer to sign type drawings.
- f. Printed Graphics on Vinyl Cladding Method: Direct to substrate flat bed UV printing Process.
- g. Printed Graphics Color: Refer to sign type drawings.
- 2. Sign Installation: Signs shall be mounted using mechanical fasteners

# 2.5 VINYL MESSAGES ON GLASS

- A. Product: 3M 7725/7125 Vinyl Series. (<u>https://www.3m.com/3M/en\_US/company-us/all-3m-products/~/3M-Scotchcal-ElectroCut-Graphic-Film-Series-7125/?N=5002385+3288743026&rt=rud</u>)
- 1. Sign Types: Refer to sign type in design drawings (V01, V02, V03, V04, V05)
- a. Application: Frist Surface Applied
- b. Vinyl Graphics, Design Layout, Font, and Color: Refer to sign type in design drawings

# 2.5 EXTERIOR WAYFINDING

A. Product: Century Sign Builders, Monolith and Aluminum Post & Panel Sign System 3.25" Wide

- 1. Sign Types: Refer to sign type in design drawings (BLDG-ID, DRL1)
- a. Overall sizes: Refer sign type drawings.
- b. Sign Faces: .090" aluminum faces mounted flush to aluminum sign retainers with counter sunk screws.
- c. Sign Frame: Constructed with aluminum angle, square tube, and extrustions.
- d. Paint Product: MAP® (Matthews Acrylic Polyurethane) UV resistant acrylic polyurethane paint
- e. Paint finish: Satin sheen finish
- f. Paint color: Refer to sign type drawings.
- g. Graphic message: Laser cut acrylic dimensional letters.

- h. Graphic message Font, Font Size and Thickness: Refer sign type drawings.
- 2. Installation: Applicable footings to be included with stamped engineered drawings.

## 2.6 DIMENSIONAL ADDRESS NUMBERS

- A. Product: Gemini Incorporated
- B. Type: formed plastic
- C. Numbers to be the font and size: Refer to design
- D. Finish refer to drawings.

# PART 3 EXECUTION

## **3.1 EXAMINATION**

- A. Examine signage for defects prior to installation. Do not install damaged signage.
- B. Inspect conditions of installation areas and other conditions which may affect installation of signage to ensure that conditions are suitable for installation.
- C. Do not begin installation until installation areas are within manufacturer's specified tolerances and have been prepared in accordance with manufacturer's instructions.
- D. Sign installation must be by sign contractor and performed accordingly to engineered requirements.
- E. Commencement of work is deemed as acceptance of installation conditions.

# **3.2 PREPARATION**

- A. Sign subcontractor is responsible for any field verification that is applicable.
- B. Clean mounting locations of dirt, dust, grease, or similar conditions that would prevent proper installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Verify completion of other installation conditions needed for sign installation including backing materials, reinforcement, electrical and data.

# **3.3 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Locate signs in accordance with approved shop drawings and project requirements.

# **3.4 CLEANING, PROTECTION AND REPAIR**

- A. Protect installed products until completion of project.
- B. If signage subcontractor is responsible for any damage touch-up, repair or replace damaged products before Substantial Completion.

## 3.5 TRAINING & CLOSEOUT

- A. Provide manufacturer's written warranty and cleaning/maintenance instructions.
- B. Provide digital templates for end-user updatable inserts.

C. Provide necessary tools and source for consumables for end-user updateable inserts.

# END OF SECTION

## SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

## 1.1 SUMMARY

- A. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
  - 1. Toilet-Enclosure Style: Floor and ceiling anchored.
  - 2. Entrance-Screen Style: .
  - 3. Urinal-Screen Style: Wall hung, flat panel .

## 1.2 SUSTAINABILITY REQUIREMENTS

- Α. :
  - 1. Recycled content.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: ASTM E84.
  - 1. Flame-Spread Index: 75 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

#### 1.4 COMPONENTS

- A. Door, Panel , Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides , with no-sightline system.
- B. Urinal-Screen Post: .
- C. Brackets (Fittings):
  - 1. Stirrup Type: Ear or U-brackets; stainless steel .
  - 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel .
- D. Phenolic-Panel Finish:
  - 1. Facing Sheet Finish: One color and pattern in each room.
  - 2. Color and Pattern: As selected by Architect from manufacturer's full range ASI Folkstone Gray 9400, with manufacturer's standard through-color core matching face sheet.
  - 3. Edge Color: Through-color matching facing sheet color.

#### PHENOLIC-CORE TOILET COMPARTMENTS 102113.17 - 1

#### 1.5 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Stainless steel finish.
- B. Hardware and Accessories: Manufacturer's heavy-duty stainless steel operating hardware and accessories.

END OF SECTION 102113.17

PHENOLIC-CORE TOILET COMPARTMENTS 102113.17 - 2

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## SECTION 102600 - WALL AND DOOR PROTECTION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Corner guards.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
- 1.3 INFORMATIONAL SUBMITTALS
- 1.4 CLOSEOUT SUBMITTALS

## PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- 2.2 CORNER GUARDS
  - A. Surface-Mounted, Opaque-Plastic Corner Guards : Fabricated as one piece from opaque polycarbonate sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - a. Inpro Corporation.
      - b. Korogard Wall Protection Systems; a division of RJF International Corporation.
      - c. WallGuard.com.
      - d. wallProtex.
    - 2. Mounting: Countersunk screws through factory-drilled mounting holes .
    - 3. Color and Texture: As selected by Architect from manufacturer's full range .
    - 4. Height: 4 feet

#### WALL AND DOOR PROTECTION 102600 - 1

#### 2.3 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
- C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- D. Adhesive: As recommended by protection product manufacturer.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
  - 3. Adjust end and top caps as required to ensure tight seams.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Custodial accessories.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Sample warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance data.
- 1.5 WARRANTY
  - A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
    - 1. Warranty Period: 15 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- 2.2 PUBLIC-USE WASHROOM ACCESSORIES
  - A. Toilet Tissue (Roll) Dispenser :
    - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
      - a. American Specialties, Inc.
      - b. Bobrick Washroom Equipment, Inc.

#### TOILET, BATH, AND LAUNDRY ACCESSORIES 102800 - 1

- c. Bradley Corporation.
- 2. Description: Double-roll dispenser .
- 3. Mounting: Surface mounted.
- 4. Operation: Noncontrol delivery with theft-resistant spindle .
- 5. Capacity: Designed for 4-1/2- or 5-inch- 5-inch- diameter tissue rolls.
- 6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) .
- B. Paper Towel (Folded) Dispenser < Insert drawing designation >:
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. AJW Architectural Products.
    - b. ASI-American Specialties, Inc.
    - c. Bobrick Washroom Equipment, Inc.
    - d. Bradley Corporation.
  - 2. Mounting: Surface mounted.
  - 3. Minimum Capacity: [600 C-fold or 800 multifold towels] <Insert capacity>.
  - 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) <**Insert material and finish**>.
  - 5. Lockset: Tumbler type.
  - 6. Refill Indicator: Pierced slots at sides or front.
- C. Grab Bar :
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.
  - 2. Mounting: Flanges with exposed fasteners.
  - 3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  - 4. Outside Diameter: 1-1/2 inches.
  - 5. Configuration and Length: As indicated on Drawings .
- D. Sanitary-Napkin Disposal Unit :
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.
  - 2. Mounting: Surface mounted.
  - 3. Door or Cover: Self-closing, disposal-opening cover.
  - 4. Receptacle: Removable.
  - 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) .
- E. Seat-Cover Dispenser :
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:

#### TOILET, BATH, AND LAUNDRY ACCESSORIES 102800 - 2

- a. American Specialties, Inc.
- b. Bobrick Washroom Equipment, Inc.
- c. Bradley Corporation.
- 2. Mounting: Surface mounted .
- 3. Minimum Capacity: 250 seat covers.
- 4. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- 5. Lockset: Tumbler type.
- F. Mirror Unit :
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.
  - 2. Frame: Stainless steel channel .
    - a. Corners: Manufacturer's standard .
  - 3. Size: As indicated on Drawings .

#### 2.3 CUSTODIAL ACCESSORIES

- A. Mop and Broom Holder :
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.
  - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf .
  - 3. Length: 36 inches .
  - 4. Hooks: Three. .
  - 5. Mop/Broom Holders: Four , spring-loaded, rubber hat, cam type.
  - 6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
    - a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
    - b. Rod: Approximately 1/4-inch- diameter stainless steel.

#### 2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

END OF SECTION 102800

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## SECTION 104413 - FIRE PROTECTION CABINETS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Fire-protection cabinets for portable fire extinguishers.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

## 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

#### 2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Guardian Fire Equipment, Inc.
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Larsens Manufacturing Company.
- B. Cabinet Construction: Nonrated .

#### FIRE PROTECTION CABINETS 104413 - 1

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- C. Cabinet Material: Cold-rolled steel sheet .
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
  - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Steel sheet .
- G. Door Style: Fully glazed panel with frame .
- H. Door Glazing: Acrylic sheet .
  - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
  - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated .
    - a. Identify fire extinguisher in fire-protection cabinet with the words " FIRE EXTINGUISHER ."
      - 1) Location: Applied to cabinet door .
      - 2) Application Process: Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Red .
      - 4) Orientation: Vertical .
- K. Materials:
  - 1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
    - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
    - b. Color: As selected by Architect from manufacturer's full range .
  - 2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, .
  - 3. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 1.5 6 mm thick, with Finish 1 (smooth or polished).

## FIRE PROTECTION CABINETS 104413 - 2

#### 2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413

## SECTION 104416 - FIRE EXTINGUISHERS

## PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section includes portable, hand-carried fire extinguishers.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Warranty: Sample of special warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Operation and maintenance data.

#### 1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Six years from date of Substantial Completion.

#### PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
  - A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
  - B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

#### FIRE EXTINGUISHERS 104416 - 1

## 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Amerex Corporation.
    - b. Guardian Fire Equipment, Inc.
    - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - d. Larsens Manufacturing Company.
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type : UL-rated 2-A, K 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

FIRE EXTINGUISHERS

## SECTION 105113 - METAL LOCKERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Knocked-down athletic lockers.
  - 2. Locker benches.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For metal lockers.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include locker identification system and numbering sequence.
- C. Samples: For each color specified.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
  - 1. Warranty Period for Knocked-Down Metal Lockers: [**Two**] years from date of Substantial Completion.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in [the USDOJ's "2010 ADA Standards for Accessible Design"].

#### 2.2 KNOCKED-DOWN ATHLETIC LOCKERS < Insert designation>

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - 1. ASI Storage Solutions.
  - 2. GSS Lockers.
  - 3. LockersMFG.
  - 4. Olympus Lockers & Storage Products, Inc.
- B. Perforated Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at [vertical edges and with right-angle single bend at horizontal edges] [and] [latch point (bottom) and right-angle single bend at remaining edges for box lockers].
  - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
  - 1. Tops and Bottoms: 0.060-inch nominal thickness, with single bend at edges.
  - 2. Backs: 0.048-inch nominal thickness.
  - 3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
- D. Unperforated Sides: Fabricated from [0.048-inch] nominal-thickness steel sheet.
- E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.097-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
- F. Reinforced Bottoms: Structural channels, formed from [**0.060-inch**] nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- G. Hinges:
  - 1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- H. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

- 1. Single-Point Latching: Nonmoving latch hook [designed to engage bolt of builtin combination or cylinder lock].
  - a. Latch Hook: Equip each door with one latch hook.
- I. Locks: Built-in combination locks .
- J. Identification Plates: Manufacturer's standard, etched, embossed, or stamped [aluminum] plates, with numbers and letters at least 3/8 inch high.
- K. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- L. Continuous Zee Base: 4 inches high; fabricated from 0.075-inch nominal-thickness steel sheet.
- M. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
  - 1. Closures: [Vertical] -end type.
- N. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- O. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- P. Materials:
  - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
  - 2. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), 3/4-inch steel mesh, with at least 70 percent open area.
- Q. Finish: Baked enamel or powder coat.
  - 1. Color: [As selected by Architect from manufacturer's full range] ASI Charcoal #23.
- 2.3 LOCKS
  - A. Built-in Combination Lock: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

#### 2.4 LOCKER BENCHES < Insert designation>

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by the following:
  - 1. ASI Storage Solutions; ASI Group.
- B. Provide bench units with overall assembly height of [17-1/2 inches].

- C. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.
  - 1. Size: Minimum 9-1/2 inches wide by 1-1/4 inches thick [except provide 20- to 24-inch- wide tops where accessible benches are indicated].
  - 2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.
- D. Fixed-Bench Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors.
  - 1. Color: [As selected by Architect from manufacturer's full range].

#### E. Materials:

- 1. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.
- 2. Steel Tube: ASTM A500/A500M, cold rolled.

#### 2.5 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
  - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
  - 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
  - 3. Coat Rods: [In lieu of ceiling hook for metal lockers 24 inches high or more]
- D. Knocked-Down Construction: Fabricate metal lockers by [preassembling at plant prior to shipping], using manufacturer's nuts, bolts, screws, or rivets.
- E. Accessible Lockers: Fabricate as follows:
  - 1. Locate bottom shelf no lower than 15 inches above the floor.
  - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.

- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
- H. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.
- I. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- J. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- K. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
- L. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- M. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
  - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
  - 2. Anchor single rows of metal lockers to walls near top [and bottom of lockers].
  - 3. Anchor back-to-back metal lockers to floor.
- B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.
- C. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
  - 1. Attach recess trim to recessed metal lockers with concealed clips.
  - 2. Attach filler panels with concealed fasteners.
  - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
  - 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.

- 5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.
- D. Fixed Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart.

END OF SECTION 105113

## SECTION 107529 - PLAZA-MOUNTED FLAGPOLES

## PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes plaza-mounted flagpoles made from aluminum [and].

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Delegated Design Submittals: For flagpoles.
  - 1. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.

#### 1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.

#### 2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Cone -tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.

#### PLAZA-MOUNTED FLAGPOLES 107529 - 1
- 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Acme Lingo Flagpoles.
  - b. American Flagpole.
  - c. Baartol Company.
  - d. Concord American Flagpole.
  - e. Ewing Flagpole Co., Inc.; Ewing Group Company.
  - f. Morgan-Francis Flagpoles and Accessories.
  - g. Pole-Tech Co., Inc.
  - h. US Flag & Flagpole Supply, LLC.
- B. Exposed Height: [20 feet].
- C. Cast-Metal Shoe Base: Made from aluminum [with same finish and color as flagpoles] <Insert finish and color> for anchor-bolt mounting; furnish with anchor bolts.
  - 1. Furnish connector to building's lightning protection system conductor.

## 2.4 FITTINGS

- A. Internal Halyard, Cam Cleat System: [5/16-inch- diameter, braided polypropylene] <Insert type> halyard; cam cleat; and concealed revolving truck assembly with plasticcoated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
  - 1. Halyard Flag Snaps: [Chromium-plated bronze] [Stainless steel] [Bronze] [Nylon] swivel snap hooks [ with neoprene or vinyl covers]. Furnish two per halyard.

#### 2.5 MISCELLANEOUS MATERIALS

A. Elastomeric Joint Sealant: joint sealant complying with requirements in Section 079200 "Joint Sealants."

#### 2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41] [AA-M12C22A31].

## PART 3 - EXECUTION

## 3.1 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to [**Shop Drawings and**] manufacturer's written instructions.

## PLAZA-MOUNTED FLAGPOLES 107529 - 2

- B. Baseplate: Install baseplate on washers placed over leveling nuts on bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
- C. Mounting Brackets and Bases: Anchor brackets and bases securely to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 107529

## PLAZA-MOUNTED FLAGPOLES 107529 - 3

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# SECTION 111313 - LOADING DOCK BUMPERS

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Section includes loading dock bumpers.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of loading dock bumper.
- B. Shop Drawings: For dock bumpers. Include plans, elevations, sections, and attachment details.

## PART 2 - PRODUCTS

## 2.1 LOADING DOCK BUMPERS

- A. General: Surface-mounted bumpers; of type, size, and construction indicated; designed to absorb kinetic energy and minimize damage to loading dock structure.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Beacon Industries, Inc.
    - b. Durable Corporation.
    - c. Hugger Dock Equipment Company; Columbus Foam Products, Inc.
    - d. Kelley; Entrematic; ASSA ABLOY.
    - e. Pioneer Dock Equipment.
    - f. Rite-Hite Holding Corporation.
    - g. Rotary Products Inc.
    - h. Serco; Entrematic; ASSA ABLOY.
    - i. Super Seal Mfg. Ltd.
    - j. Vestil Manufacturing Company.
- B. Laminated-Tread Loading Dock Bumper: Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires.
  - 1. Thickness: 6 inches .
  - 2. Horizontal Style: 12 inches high by [length indicated on Drawings] <Insert dimension>.
- C. Materials: ASTM 36/A 36M for steel plates, shapes, and bars. Hot-dip galvanize according to ASTM A 123/A 123M.

## PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
  - A. Attach loading dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
  - B. After completing installation of exposed, factory-finished dock bumpers, inspect exposed finishes and repair damaged finishes.

END OF SECTION 111313

## LOADING DOCK BUMPERS 111313 - 2

# SECTION 122413 - ROLLER WINDOW SHADES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Manually operated roller shades with single rollers.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Samples: For each exposed product and for each color and texture specified.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Operation and maintenance data.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: Fabricator of products.

#### PART 2 - PRODUCTS

#### 2.1 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - 1. BTX Intelligent Fashion, LLC.
  - 2. CACO, Inc.
  - 3. DFB Sales, Inc.

## ROLLER WINDOW SHADES 122413 - 1

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- 4. Draper, Inc.
- 5. Hunter Douglas, Inc.
- 6. Insolroll Window Shading Systems.
- 7. MechoShade Systems, LLC.
- 8. OEM Blinds LLC.
- 9. Rollease Acmeda Inc.
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. Chain-Retainer Type: Chain tensioner, jamb mounted < Insert description>.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated driveend assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: Right side of interior face of shade <**Insert** requirements>.
  - 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller .
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
  - 1. Shadeband Material: Light-filtering fabric < Insert requirements>.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Exposed with endcaps <Insert description>.
    - b. Color and Finish: As selected by Architect from manufacturer's full range <**Insert color and finish**>.
- F. Installation Accessories:
  - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
  - 2. Endcap Covers: To cover exposed endcaps.
  - 3. Installation Accessories Color and Finish: As selected from manufacturer's full range <**Insert color and finish**>.

# 2.2 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with [NFPA 701] <Insert requirement>. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

- 1. Source: [Roller shade manufacturer] < Insert source for custom fabrics>.
- 2. Type: Olefin and Polyester .
- 3. Weave: Mesh < Insert description>.
- 4. Thickness: <**Insert thickness**>.
- 5. Weight: <**Insert** oz./sq. yd.>.
- 6. Roll Width: 60 inches < Insert dimension>.
- 7. Orientation on Shadeband: [Up the bolt] <Insert requirements>.
- 8. Openness Factor: 3 < Insert number > percent.
- 9. Color: As selected by Architect from manufacturer's full range < Insert color>.
- 2.3 ROLLER SHADE FABRICATION
  - A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1
  - B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
    - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
  - C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
    - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than [1:4] <Insert ratio>, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

#### PART 3 - EXECUTION

#### 3.1 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Opaque Shadebands: Located so shadeband is not closer than [2 inches] <Insert dimension> to interior face of glass. Allow clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- D. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

## ROLLER WINDOW SHADES 122413 - 3

END OF SECTION 122413

# ROLLER WINDOW SHADES 122413 - 4

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# SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Solid surface material countertops.
  - 2. Solid surface material backsplashes.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

## PART 2 - PRODUCTS

## 2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Avonite Surfaces; a Brand of Aristech Surfaces LLC.
    - b. DuPont; DuPont de Nemours, Inc.
    - c. Formica Corporation.
    - d. LG Hausys, Ltd.
    - e. Wilsonart LLC.
  - 2. Type: Provide Standard type [ or Veneer type made from material complying with requirements for Standard type, as indicated] unless Special Purpose type is indicated.
  - 3. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- B. Particleboard: ANSI A208.1, [Grade M-2] [Grade M-2-Exterior Glue].
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

## 2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Grade: Premium .
- B. Configuration:
  - 1. Front: 3/4-inch bullnose .
  - 2. Backsplash: Beveled .
- C. Countertops: 3/4-inch- thick, solid surface material [ with wood-trimmed edges] [ with front edge built up with same material].
- D. Backsplashes: 1/2-inch- thick, solid surface material [ with wood-trimmed edges].
- E. Joints: Fabricate countertops without joints.

#### 2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.
- B. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- C. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- D. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

# SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

## 1.1 COMPONENTS

- A. Roll-up, Aluminum-Rail Hinged Mats: Continuous vinyl cushions.
  - 1. Tread Inserts: .
- B. Roll-up, Vinyl-Rail Hinged Mats: Slotted or perforated hinges.
  - 1. Tread Inserts: .
- C. Resilient Link Mats: link mats with -steel wire link rods.
- D. Rubber Mats: Beveled edges for surface applications.
- E. Cocoa Mats: PVC backing.
- F. Rubber-Tire Mats: Continuous linear strip.
- G. Carpet-Type Mats: Polyester.
- H. Loop Filament Mats: sheet backing.
- I. Rubber-Tire Tiles: tiles.
- J. tiles.
- K. Carpet-Type Tiles: carpet with nonraveling edges.
- L. Recessed Frames: .
- M. Surface-Mounted Frames: Tapered .
- N. Aluminum Frame Finish: .

END OF SECTION 124813

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