

# Jones Gillam Renz Architects

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# **Project Manual**

for

# ROSSVILLE FAMILY DENTAL RENOVATION Rossville, Kansas

September 20, 2023

Project No. 22-3211

# ROSSVILLE FAMILY DENTAL RENOVATION ROSSVILLE, KANSAS

Project No. 22-3211

DATE OF DRAWINGS AND SPECIFICATIONS	September 20, 2023
OWNER	ROSSVILLE FAMILY DENTAL 443 Main St. Rossville, KS 66533 Scott Guest 913 645 0079
ARCHITECT	JONES GILLAM RENZ ARCHITECTS, INC Charles A. Renz, Project Architect 730 N. 9 <sup>th</sup> Street, Salina, KS 67401 785 827 0386
STRUCTURAL ENGINEERS	BOB D. CAMPBELL & CO. Chris Beverlin, P. E. 4338 Belleview, Kansas City, MO 64111 816 531 4144
MECHANICAL/ELECTRICAL	LST CONSULTING ENGINEERS, INC. John Lewis Smith, P.E 4809 Vue Du Lac Pl, Ste 201, Manhattan, KS 66503 785 587 8042 Fax 785 587 8039

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Project No. 22-3211

# INVITATION TO BID

Sealed Bids, will be received by Rossville Family Dental, Rossville, Kansas, for the furnishing of all labor and materials as hereinafter specified for the construction of Rossville Family Dental Renovation in Rossville, Kansas. Bids shall be delivered to the office of JGR Architects, 730 North Ninth Street, <u>before **Thursday**</u>, **November 2**, 2023 at 2:00 p.m. Bids received after this time will not be accepted. Bids will be opened in private session with the owner the same day.

- 1. PROJECT SCOPE
  - a. Building, Existing: Existing Single Story 5.600 sf single story building renovation including demolition of existing walls, finishes, and building features.
  - b. Footing/Found: Existing foundations included concrete piers and grade beams. Minimal disruption to foundation systems.
  - c. Roof Structure: Existing Wood Trusses with plywood deck
  - d. Exterior Finishes: Brick & precast stone veneers, Storefront & windows. Work includes some brick modification for new windows. Alternate for EIFS finish at upper eave area.
  - e. Floor Finishes: Carpet Tile, Walk-off Carpet tile, LVT Plank, and Ceramic Tile
  - f. Ceilings Finishes: Painted Gyp Bd, Suspended grid & Acoustic Tile.
  - g. Custom Cabinetry: Plastic Laminate, Stain & Finished wood.
  - h. Wall Finishes: Painted Gypsum Board, Wood Panel, and Ceramic Tile.
  - i. Roof Membrane: Existing Shingle Roof to be replaced. Deck repair required in areas
  - j. Paving: Concrete paving, Concrete curb and gutter
  - k. Mechanical:

Gas fired split systems Exhaust fans for restroom exhaust. Flush valve water closets and urinals. Gas fired water heater

l. Plumbing:

Waste, Vent Piping, equipment, and plumbing fixtures. Domestic water, equipment, and fixtures Gas Piping, and equipment

- m. Electrical:
  - Existing Electrical Service, Main distribution panel remains. New distribution panels. New Lighting and exterior wall lighting.
  - Conduit & cabling for owner's data systems.
- n. Site Utilities Existing to remain
- 2. PRE-BID CONFERENCE

Pre-Bid Conference will be held on <u>Wednesday, October 11, 2023</u> at 2:00 p.m. at building site, 443 Main St., Rossville, KS Failure to attend may be grounds for rejection of your bid.

The building will be unlocked and made available for all interested sub-contractors on <u>Wednesday, October</u> 25, 2023 from 10:00 a.m. to 2:00 p.m.

# 3. COMPLETION TIME

Completion date for the project is to be bid in calendar days: April 1, 2024.

- 4. The GENERAL CONSTRUCTION CONTRACT will include General Construction, Mechanical, and Electrical Work combined into one Contract.
- 5. As a condition precedent to Contract Award, type of work completed and proposed Subcontractors will be carefully considered. Owner is not obligated to accept lowest or any other bid.
- 6. The Owner has identified a Select Bidders List for the General Construction. The Pre-Approved Bidders include:

MCP Group, Topeka, KS BHS Construction, Manhattan KS  The Drawings, Specifications, and Contract Documents may be obtained by bona fide Prime Bidders (Mechanical and Electrical, and Subcontractors) from Jones Gillam Renz Architect, 730 North 9th Street, Salina, Kansas 67401, 785-827-0386 upon deposit of <u>\$200.00</u> for one (1) set of General Construction, Mechanical and Electrical Drawings and Specifications.

Electronic Drawings and specifications will be available for review on the website at www.jgrarchitects.com. Mechanical, Plumbing and Electrical Subcontractors who are bidding from documents via website or plan room must contact the office of Jones Gillam Renz Architects, 785.827.0386 to register as an official Plan Holder.

Those who submit prime bids may obtain refund by returning sets in good condition no more than one (1) week after bids have been opened. No refund of deposit will be made to Contractors not submitting a bid, unless all documents are returned in good condition five (5) days prior to time of receiving bids.

CONTRACT DOCUMENTS will be on file and may be examined at the following locations: Jones Gillam Renz Architects, 730 North 9th Street, Salina, KS 67401, ph. 785-827-0386, <u>www.jgrarchitects.com</u> Associated General Contractors of Kansas, ph. 316-928-8635, <u>www.agcks.org</u> KCNR, LLC., ph. 316-263-0265, <u>https://kcnr.net</u> Dodge Construction Network, ph. 877-784-9556, <u>www.construction.com</u> Construct Connect, ph. 877-969-2909, <u>www.cmdgroup.com</u> Salina Blueprint, 209 S. Santa Fe Ave., Salina, KS 67401, ph. 785-827-6182, <u>www.salinablue.com</u>

# 8. **BID SECURITY in the amount of 5% of the bid must accompany each bid in accordance with INFORMATION FOR BIDDERS.**

BY ORDER OF:

Rossville Family Dental Rossville, Kansas

# INFORMATION FOR BIDDERS

# 1. EXAMINATION

Before submitting their bid, each Bidder shall carefully examine all documents pertaining to the work, visit the site of the work, and inform themselves as to all existing conditions under which the work will be performed. Submission of a bid will be considered presumptive evidence that the Bidder is fully aware of the conditions of the work, requirements of the Contract Documents, pertinent State and Local codes, conditions of labor and material markets, and has made allowances in their bid for all work and all contingencies. Contractors will not be given extra payments for conditions which can be determined by examining the site and documents.

# 2. QUESTIONS AND INTERPRETATION OF DOCUMENTS

Should a Bidder be in doubt as to the meaning of any part of the Drawings, Specifications or other proposed Contract Documents and/or find discrepancies in or omissions from the Drawings, Specifications and Contract Documents, they shall contact the Architect immediately per Article 3, Subparagraph 3.2.1 of the AIA General Conditions. Any interpretation of the proposed documents will be made only by Addendum duly issued and copy of such Addendum will be mailed or emailed to each person receiving a set of such documents. The Architect and Owner will not be responsible for any other explanation or interpretation of the proposed documents.

# 3. GENERAL CONSTRUCTION BID

- a. The General Construction bid shall incorporate all of the departments of Work (General Construction, Electrical, and Mechanical Work) into one (1) bid. It is preferred that General Contractors work with Prime subcontractors with whom they have previous working relationships, including at least three previous projects of similar scope. Contractor/Subcontractor experience and relationship may be considered by the owner in the evaluation of bids and acceptance of bids.
- b. The General Contractor shall assume all responsibility for supervision and coordination of the Work.
- c. The General Contractor shall furnish Performance and Payment Bonds in the full amount of the Work (Total of General Construction, Electrical, and Mechanical Work).
- d. The General Contractor shall carry and pay the premium covering the General Construction Work, for Contractors and Subcontractors Insurance as specified in Supplementary Conditions of the Contract.

# 4. BID PROCEDURE

- a. Bids will be received at the time and place stated in the INVITATION TO BID. Bids received after the time stated will be returned unopened.
- b. No oral or telephonic bids will be considered, but modifications by telephone or email of bids already submitted will be considered if received prior to time set for bid opening.
- c. Any addenda issued during the time of preparation of bids are to be acknowledged on the Bid Form and in closing a Contract, they will become a part thereof.
- d. Each Bidder is required to bid all alternates included in the Bid Form, except that should they desire not to bid an Alternate, they may insert the words "No Bid" in the space provided for such Alternates. In such case, if it is determined to use such Alternate, the fact that the cost of the material, type, or method bid may be lower than that chosen shall not constitute the basis of a claim by the Bidder that the Contract be awarded to them. If an Alternate Price called for involves no change in price, Bidder shall so indicate by writing the words, "No Change" in the space provided. Refer to Section 01019 SPECIAL PROVISIONS. Each Bidder is required to fill in all unit cost items shown on the Bid Form. Failure to comply may be cause for rejection.
- e. Bids shall be submitted on the forms provided. All blank spaces on the forms shall be fully completed in words as well as figures. Bid Forms must be signed in longhand, with name typed below signature. Where Bidder is a corporation, Bid Forms must be signed with legal name of corporation, followed by the name of the State of Incorporation, the legal signature of an officer authorized to bind the corporation to a contract, Attest and Seal Impression. A copy of the Bid Form is bound herein for the convenience of the Bidders and is not to be detached or filled out. Separate Bid Forms, will be furnished to all Bidders.

- f. Submittals of Bids shall be as follows:
  - Bids, together with Bid Security, shall be sealed in an opaque envelope, labeled "ROSSVILLE FAMILY DENTAL REMODEL, ROSSVILLE, KS, SEALED BID, DO NOT OPEN" addressed to: Rossville Family Dental, 443 Main St, Rossville, KS 66533. Bids shall be delivered to the office of JGR Architects, 730 North Ninth St., Salina, KS before 2:00 pm on Tuesday, October 17, 2023. Bids will be opened in private session with the owner the same day.
  - 2) Bids may be submitted electronically to jgr@jgrarchitects.com and srogge@jgrarchitects.com

# 5. CONTRACT GUARANTEE

Successful Bidder must deliver to the Owner the following Bonds in an amount no less than 100% of the accepted bid, as security for the faithful performance of the Contract.

- a. Performance and Payment Bond as per General Conditions.
- b. Statutory Bond, as required in Section 01019 SPECIAL PROVISIONS.
- 6. WITHDRAWAL OF BIDS

A bid may be withdrawn on written or emailed request and by request of Contractor personally, received or made prior to time fixed for bid opening. No bid may be withdrawn after opening of bids.

- 7. INTERPRETATION OF QUOTED PRICES In case of a difference in written words and figures in a bid, the amount stated in written words shall govern.
- 8. TIME OF CONSTRUCTION AND LIQUIDATED DAMAGES Refer to Section 01019 - SPECIAL PROVISIONS.
- 9. DISQUALIFICATION

The Owner reserves the right to disqualify bids, before or after opening upon evidence of collusion with intent to defraud or illegal practices upon part of the Bidder. Bids will be opened as stated in the Invitation to Bid.

10. SALES TAX EXEMPTION Refer to Section 01019 - SPECIAL PROVISIONS.

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# **Rossville Family Dental Renovation, Rossville, Kansas BID FORM**

		Bid of		
		Date	(Firm Nam	e)
BID FO Rossvil	ORM FOR: le Family Dental Renovation, Rossville, Kansas	Date _		
TO:	Rossville Family Dental 443 Main St. Rossville, KS 66533			
In comp work fo of <u>Ross</u> dated S	pliance with your INVITATION TO BID, the undersigned pro or the General Construction, including Mechanical and Electric <u>wille Family Dental Renovation, Rossville, Kansas</u> , in strict ac eptember 20, 2023 mentioned therein for the consideration of	pposes to fi cal Work, i ccordance the follow	urnish all labo incidental for with the Speci ing:	r and materials and perform all the construction and equipping fications and the Drawings
BASE	BID			Dollars
	\$			
The Ba	se Bid includes all allowances as outlined in Section 01019	– Special	Provisions.	
Number coordin	r of consecutive Calendar Days to complete this project in acc ated with General Contractor and subject to Liquidated Dama	ordance w ges,	ith Drawings a	and Specifications, to be
Section	01019 - SPECIAL PROVISIONS			DAYS
The Un	dersigned acknowledges receipt of the following addenda:			
Addend	lum #1 Addendum #2 Addendum #3	Adden	dum #4	Addendum #5
<u>ALTE</u> ADD	ERNATE PRICES: For the Alternates as described in the Spec or DEDUCT the following amounts to or from the BASE BID	cifications and as herein	and/or Drawin after itemized	gs, the undersigned agrees to
ALTI	ERNATE NO.			ADD/DEDUCT
<u>Alterr</u> Remo	<u>nate No. 1</u> ve fireplace completely.		\$	
<u>Alterr</u> New c	nate No. 2 concrete parking.		\$	
<u>Alterr</u> Remo	nate No. 3 we existing drive-thru canopy, columns, and island.		\$	
<u>Alterr</u> Remo	nate No. 4 we built up freeze trim and install new EFIS trim.		\$	
<u>Alterr</u> Sterili	nate No. <u>5</u> ization cabinetry at room 115.		\$	

#### I (or WE) FURTHER AGREE AS FOLLOWS:

- 1. To furnish labor and materials for additional work (except Mechanical and Electrical) ordered by the Owner and for which no pre-agreed upon amount has been determined for the cost of the labor and materials involved plus 10% for overhead and profit.
- 2. To furnish supervision and coordination for 10% of the cost of additional Mechanical and Electrical work ordered by the Owner.
- 3. To accept the provisions of Section 01019 SPECIAL PROVISIONS regarding the date of completion of the Project and Liquidated Damages.
- 4. If written notice of the acceptance of the Bid is mailed, telegraphed or delivered to the Undersigned within 30 days after the date of the opening of the Bids, or anytime thereafter before this Bid is withdrawn, the Undersigned will, within ten (10) days after the date of such mailing, telegraphing or delivery of such notice, execute and deliver a contract in accordance with AIA Document A101, Standard Form of Agreement Between Owner and Contractor, and give Performance Bond in accordance with the Specifications and bid as accepted.
- 5. That upon failure or refusal to execute and deliver the contract and bonds required within ten (10) days after receipt of notice of acceptance of the Bid, that security deposited with Bid shall be forfeited to the Owner as liquidated damages for such failure or refusal.

# DECLARATION:

- 1. The Undersigned hereby declares that he has carefully examined the Invitation and Information for Bidders, the Drawings and Specifications, has visited the actual location of the Work and has consulted his sources of supply, and has satisfied himself as to all quantities and conditions, and understands that in signing this Bid, he waives all rights to plead any misunderstanding regarding the same.
- 2. The Undersigned understands that his competence and responsibility and that of his proposed subcontractors, time of completion, as well as any other factors of interest to the Owner will be considered in making the award. The Owner reserves the right to reject any or all bids, to accept or reject alternate bids and unit prices and to waive technicalities concerning the bids received, as it may be in his interest to do so.

(Legal Name of Bidder)

(SEAL, if bid is by a corporation)

(Address of Bidder)

BY \_\_\_\_\_ in longhand

(Title)

# ${}^{\textcircled{\mbox{\footnotesize M}}}AIA^{\mbox{\scriptsize M}}$ Document A201<sup> $^{\circ}$ </sup> – 2017

# General Conditions of the Contract for Construction

# for the following PROJECT:

(Name and location or address)

**Rossville Family Dental Renovations** Rossville, Kansas JGR No. 22-3211

# THE OWNER:

(Name, legal status and address)

New Horizons Dental Practice Management 1700 East Iron Salina, KS 67401

#### THE ARCHITECT:

(Name, legal status and address)

Jones Gillam Renz Architects, Inc. Charles Renz, Principal 730 N. Ninth St. Salina, KS 67401 **TABLE OF ARTICLES** 

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# ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503<sup>™</sup>, Guide for Supplementary Conditions.

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# ARTICLE 1 GENERAL PROVISIONS

# § 1.1 Basic Definitions

# § 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

# § 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

# § 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

# § 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

# § 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

# § 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

# § 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

# § 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

# § 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

# § 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

#### § 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

#### § 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

#### § 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

# § 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203<sup>TM</sup>-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

#### § 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203<sup>TM</sup>–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202<sup>TM</sup>–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

# ARTICLE 2 OWNER

# § 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

#### § 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential." the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

# § 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

#### § 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

#### § 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

# ARTICLE 3 CONTRACTOR

#### § 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

# § 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

# § 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees. Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

# § 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

## § 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

#### § 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

#### § 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

#### § 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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# § 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

# § 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

# § 3.10 Contractor's Construction and Submittal Schedules

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

# § 3.11 Documents and Samples at the Site

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The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

# § 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

#### § 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

#### § 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

# § 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

# § 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

# § 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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# § 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts. disability benefit acts, or other employee benefit acts.

# **ARTICLE 4 ARCHITECT**

#### § 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

#### § 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

# § 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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# **ARTICLE 5 SUBCONTRACTORS**

# § 5.1 Definitions

**§ 5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

# § 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**§ 5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

# § 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

# § 5.4 Contingent Assignment of Subcontracts

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§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor, and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.
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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

# ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

#### § 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

# § 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

# § 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

# ARTICLE 7 CHANGES IN THE WORK

# § 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

# § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

# § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- As provided in Section 7.3.4. .4

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others:
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

# § 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

# **ARTICLE 8 TIME**

# § 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

**§ 8.1.4** The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

## § 8.2 Progress and Completion

**§ 8.2.1** Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

**§ 8.2.2** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

**§ 8.2.3** The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

#### § 8.3 Delays and Extensions of Time

**§ 8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

**§ 8.3.3** This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

# ARTICLE 9 PAYMENTS AND COMPLETION

#### § 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

**§ 9.1.2** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

#### § 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

#### § 9.3 Applications for Payment

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**§ 9.3.1** At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

**§ 9.3.1.1** As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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**§ 9.3.1.2** Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

**§ 9.3.2** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

**§ 9.3.3** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

## § 9.4 Certificates for Payment

**§ 9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reasons for Withholding certification and Owner of the Architect's reasons for Payment, and notify the Contractor and Owner of the Architect's reasons for Section 9.5.1; or (3) withhold certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

## § 9.5 Decisions to Withhold Certification

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**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
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- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor,
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

## § 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2. 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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#### § 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

## § 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

## § 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

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§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

#### § 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment. except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

## § 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

## § 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor, and
- other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, .3 structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

## § 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

## § 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

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promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

## § 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

## **ARTICLE 11 INSURANCE AND BONDS**

#### § 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## § 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## § 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise. (2) even though that person or entity did not pay the insurance premium directly or indirectly. or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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## § 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

## §11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

## ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

## § 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

## § 12.2 Correction of Work

## § 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

## § 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during

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that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-vear period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

#### § 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

#### ARTICLE 13 MISCELLANEOUS PROVISIONS

#### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

#### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

## § 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

## § 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

## § 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

## § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

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§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

## § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- repeatedly refuses or fails to supply enough properly skilled workers or proper materials; .1
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- Exclude the Contractor from the site and take possession of all materials, equipment, tools, and .1 construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

## § 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

## § 14.4 Termination by the Owner for Convenience

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§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- cease operations as directed by the Owner in the notice; .1
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- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice. terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

## **ARTICLE 15 CLAIMS AND DISPUTES**

#### § 15.1 Claims

## § 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

## § 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### § 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

## § 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

## § 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### § 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

**§ 15.1.6.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

## § 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

## § 15.2 Initial Decision

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**§ 15.2.1** Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

**§ 15.2.2** The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

**§ 15.2.3** In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

**§ 15.2.4** If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

**§ 15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

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§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

#### § 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

## § 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation. but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

## § 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

# SUPPLEMENTARY CONDITIONS OF THE CONTRACT

- 1. DEFINITIONS Supplement Paragraph 1.1 as follows:
  - a. When words such as approved, proper, satisfactory, equal, and as directed are used, they imply such reference to the Architect's specific approval and directions.
  - b. Provide means to furnish and install.
  - c. The provisions of the Agreement take precedence over all other Contract Documents.
- 2. WARRANTY Supplement Paragraph 3.5.1 as follows:
  - a. Contractor warrants to Owner and Architect that on receipt of notice from either of them, within the period of one (1) year following date of Substantial Completion, that defects in materials and/or workmanship have appeared in the Work, Contractor will promptly correct such defects to the state of condition originally required by the Contract Documents at Contractor's expense.
- 3. SHOP DRAWINGS Supplement Paragraph 3.12 as follows:
  - a. The Contractor shall submit **one** (1) **electronic copy** of all Shop or Setting Drawings and Schedules required for the work of the various trades, after same have been checked and compared with the Contract Document Requirements, and after checking with field conditions at the job and so certified on the Drawings by the Contractor. Above Drawings will not be checked by Architect unless same bear certification.
  - b. Architect's approval is subject to notations on Drawings, Compliance with Drawings and Specifications, and conditions and measurements at project. Measurements and quantity not checked or approved.
- 4. SAMPLES Supplement Subparagraph 3.12.3 as follows:
  - a. All samples as called for in the various Sections of this Specification and any other samples, as directed, shall be furnished by the Contractor for approval.
  - b. All samples of materials that require approval as to color, texture, finish and type shall be furnished at the same time, so that an intelligent selection of colors and textures may be made by the Architect.
- 5. COLOR SELECTIONS
  - a. The Contractor shall provide for and coordinate into the project construction schedule, a 6-week time frame for the Architect/Designer to make final color selections from Contractor's submittals, obtain approval from the Owner and to submit a color schedule, indicating what colors go where, to the Contractor. Time frame begins when Architect has received 100% of submittals listed below.
  - b. Submittals, i.e., actual samples, manufacturers' literature, full color line options, etc., shall include as a minimum, but not limited to:
    - Carpet Types Sheet Vinyl Flooring Vinyl Composition Tile Flooring Vinyl Base Ceramic Wall Tile Ceiling Types Paint Corner Guards Plastic Laminate (Manufacturer) Wood Stain for Doors and Woodwork Aluminum Storefront System
- 6. CLEAN UP Supplement Paragraph 3.15 as follows:
  - a. Each Contractor shall, at all times, remove any and all of their rubbish from the buildings and grounds and keep the building site clean.
  - b. In addition to the general broom cleaning, the General Contractor shall do the following special cleaning for all trades at the completion of the work:
    - 1) Glass. Remove putty, stains and paint from all glass and wash and polish same. Care shall be taken not to scratch the glass.
    - 2) Painted, Decorated, and Stained Work. Remove all marks, stains, fingerprints and other soil or dirt from all painted, decorated, and stained work.

- 3) Temporary Protection. Remove all temporary protections; clean and polish all floors at completion.
- 4) Woodwork. Clean and polish all woodwork upon completion.
- 5) Hardware. Clean and polish all hardware for all trades. This shall include removal of all stains, dust, dirt, paint, etc., upon completion.
- 6) Tile Work. Remove all spots, soil, and paint from all tile work, wash same upon completion.
- 7) Fixtures and Equipment. Clean all fixtures and equipment, removing all stains, paint, dirt, and dust.
- c. All combustible rubbish, and all debris and other rubbish shall be removed entirely from the premises.
- 7. MUTUAL RESPONSIBILITY OF CONTRACTORS Supplement Paragraph 6.2 as follows:
  - a. General Contractor shall assume general coordination and direction of the project. General Contractor shall cooperate with Mechanical and Electrical Contractors and other subcontractors and/or suppliers on the Work and install their work in sequence to facilitate and not delay the completion of the project. The Architect is not the coordinator or expeditor of the work of the contractors and/or subcontractors referred to hereinbefore.

# 8. CHANGES IN THE WORK

Refer to Paragraph 7.2 and insert the following:

- a. Whenever a Change Order involves net cost decrease, the CREDIT to the Owner shall be such net cost decrease. Whenever a Change Order involves a summary net increase, the Contract shall be increased by the amount of such net cost increase plus 10% of such net cost for overhead and profit. The General Contractor will furnish supervision and coordination for 10% of the cost of additional Mechanical and Electrical work ordered by the Owner.
- b. The Contractor shall furnish the Owner an itemized accounting with supporting data used in computing the value of any change that might be ordered.
- c. Change Orders must state a number of added days or days to be deleted from completion time. If no change in days is required by the change order, write NONE. Failure to comply with above voids any later request for extra time.

# 9. APPLICATION FOR PROGRESS PAYMENTS AND CERTIFICATION FOR PAYMENT

- a. Amend Subparagraph 9.3.1 and insert the following: On or before the 25th day of each month, the Contractor shall submit to the Architect an itemized Application for Payment supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require.
- b. Amend Subparagraph 9.4.1 and insert: If the Contractor has made application for payment as above, the Architect will, with reasonable promptness and within seven (7) days after receipt of the application, issue an application for payment to the Owner, with a copy to the Contractor in the amount of 90% of the value of the Contract the Architect determines has been completed to the date of application, thus a 10% retainage, less any amount paid to the Contractor, or state in writing his reason for withholding an application as provided in Subparagraph 9.5.1.
- c. Date of payment of the Application for Payment by the Owner is hereby defined as the earliest possible date that the Owner can prepare vouchers after receipt of Application for Payment from the Architect and approval of same by any governing body of the Owner and issuance of vouchers to cover Application for Payment.
- 10. CONTRACTOR'S LIABILITY INSURANCE
  - a. Workers' Compensation and Employers Liability Insurance Refer to Subparagraph 11.1.1.
    - Bodily Injury and Property Damage Refer to Subparagraph 11.1.2. Limits shall be as follows: (1) Limits of liability coverage shall be \$2,000,000.00 Combined Single Limit for Bodily
    - Injury and Property Damage.
  - c. Owner's Protective Liability Insurance Refer to Paragraph 11.2 Owner's Option.
- 11. PERFORMANCE AND PAYMENT BONDS Supplement Subparagraph 11.4.1 as follows:
  - a. Bond shall be equivalent to AIA Form A311, two part Performance Bond and Labor and Materials Bond with amount shown on each part equal to 100% of the total amount payable by the terms of the Contract. Surety shall be company licensed to do business at the place of building and shall be acceptable to the Owner.

b.

- 12. PROPERTY INSURANCE MARINE ALL RISK SPECIAL BUILDERS RISK AND TRANSIT FORM Refer to Paragraph 11.4 Property Insurance and insert the following:
  - a. Until the Work is completed and accepted by the Owner, the <u>General Contractor</u> shall effect and maintain total Property Insurance (Marine All Risk Special Builders Risk and Transit Form) upon the Work at the site to 100% of the insurable value thereof (plus 8% of this insured value for Architect's Fee in connection with any loss covered by this insurance) including items of labor and materials connected therewith in or adjacent to the structure insured, materials in place or to be used as a part of the permanent construction, including surplus materials, shanties, protective fences, bridges or temporary structures, miscellaneous materials and supplies incidental to the Work, and such scaffoldings, stagings, towers, forms and equipment as are not owned or rented by the Contractor, the cost of which is included in the cost of the work. EXCLUSIONS: This insurance does not cover any tools owned by mechanics; any tools, equipment, scaffoldings, stagings, towers and forms owned or rented by the Contractor; the capital value of which is not included in the cost of the work, nor loss of equipment, materials, tools, etc., by theft. Contractor shall not commence construction prior to receipt of policy copy from Owner.
  - b. This insurance shall include the interest of the Owner, the Contractor, Subcontractor, and Sub-Subcontractor in the Work.

END OF SECTION

#### General

	Cover
CFP	Code Footprint
ADA	ADA Diagrams

#### Architectural

<sup>1</sup> m cmit	cetur ai		
D1.1	Site Demolition Plan	A4.2	Wall Sections
D2.1	Floor Demolition Plan	A4.3	Wall Sections
D2.2	Photos	A5.1	Roof Plan
D3.1	Demolition Elevations	A7.1	Reflected Ceiling Plan
A1.1	Site Plan	A8.1	Interior Elevations
A2.1	Floor Plan	A9.1	Interior Elevations
A2.2	Finish Floor Plan	A9.2	Interior Elevations
A3.1	Exterior Elevations	A9.3	Casework Elevations
A3.2	Exterior Elevations	A9.4	Casework Elevations
A3.3	Building Section	A9.5	Casework Sections
A4.1	Wall Sections	A10.1	Finish & Door Schedules and Details
<u>Struct</u> S0.1 S2.1 S2.2	<b>ural</b> General Notes & Details Foundation Plan Framing Plan		
Mecha	nical		
ME1.1	M/E Demolition Plan	M1.3	Domestic Water, Gas, and Compressed Air Plan
M1.1	Mechanical Plan	M6.1	Schedule and Details
M1.2	Waste and Vent Plan		
Electr	ical		
E1.1	Lighting Plan	E1.3	Special Systems Plan
E1.2	Power Plan	E6.1	Schedules

# Dental Equipment Eight Sheets

## SECTION 01010

## GENERAL WORK REQUIREMENTS

## 1. GENERAL

Should conflict occur between these General Work Requirements and the General Conditions, the requirements of this Section take precedence.

## 2. INTENT OF DOCUMENTS

The Contract Drawings are complementary and what is called for by anyone shall be as binding as if called by all. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work.

## 3. MANUFACTURER'S DIRECTIONS

All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturers, unless herein specified to the contrary.

## 4. BUILDING PERMIT

As stated in Subparagraph 4.7.1, AIA DOCUMENT A201, General Conditions, the General Contractor shall secure and pay for the building permit.

## 5. MATERIALS - EQUIPMENT - SUBSTITUTION

- A. In general, these Specifications identify the required materials and equipment by naming one or more manufacturers, brand, model, catalog number, and/or other identification; the first-named manufacturer's product used as a basis for design; the other named brands considered equivalent. Equivalent brand manufacturers named must furnish products consistent with the Specifications for the first-named product, as determined by the Architect. Base Bid shall include only those brands named and must be used on the project, except as hereinafter provided.
- B. Materials or equipment specified exclusively, Base Bid shall be based on same and used on project, except as hereinafter provided.
- C. Prior to receipt of bids, should Contractor wish to incorporate in Base Bid, brands or products other than those named in the Specifications, he shall submit written request for substitution to Architect not later than seven (7) days prior to date bids are due. Architect will consider request and items approved will be listed in an addendum issued to all bidders.
- D. After execution of Contract, substitution of product brands for those named in the Specifications will be considered, only if request is received within thirty (30) days after Contract Date and request includes showing credit due Owner.
- E. Materials specified equivalent and those proposed for substitution must be equal or better than first-named material in construction, efficiency, utility, aesthetic design, and physical size shall not be larger than space provided for it. Request for substitution by full description and technical data in two (2) copies, including manufacturer's name, model, catalog number, photographs or cuts, physical dimensions, operating characteristics, and any other information for comparison.
- F. Owner reserves the right:
  - 1) To require any or all bidders, before execution of Contract, to state what materials they will use.
  - To require "if bound with the Bid Form," the Contractor to fill out a BID SUPPLEMENT listing the BASE BID and "ADD" or "DEDUCT" for other materials he proposes to use.

## 6. APPROVAL OF SUBCONTRACTORS - MATERIALS

- A. The Contractor, if requested, must submit for approval before signing Agreement, list of Subcontractors and material suppliers enumerating items of work to be performed, name of materials, equipment, etc., to be furnished and/or installed. Refer to Paragraph MATERIALS EQUIPMENT SUBSTITUTION.
- B. If the list is not requested prior to signing of Agreement, list, as described in previous paragraph, shall be furnished within ten (10) days of signing Agreement.
- 7. PROTECTION Supplement, ARTICLE 10, AIA GENERAL CONDITIONS
  - A. Refer to Paragraph WEATHER CONDITIONS.
  - B. Each Contractor shall assume responsibility for his materials stored on the premises.

- C. General Contractor shall take charge and assume general responsibility for proper protection of project during construction.
- D. The General Contractor shall protect trees, shrubs, lawns, and all landscape from damage, providing guards and covering. Damaged work shall be repaired or replaced at his expense. Protect streets and sidewalks and make repairs at his expense.
  - 1) Water Protection. The General Contractor shall, at all times, protect the excavation, trenches, and/or the building from damage by rain water, spring water, ground water, backing up of drains or sewers and all other water. He shall provide all pumps and equipment and enclosures to provide this protection.
  - 2) Bracing, Shoring, and Sheeting. The General Contractor shall provide all shoring, bracing and sheeting as required for safety and for the proper execution of the work and have same removed when the work is completed.
  - 3) Guard Lights. The General Contractor shall provide and maintain guard lights at all barricades, railings, obstructions in the streets, roads or sidewalks and at all trenches or pits adjacent to public walks or roads.
  - 4) Weather Conditions. The General Contractor shall, at all times, provide protection against weather; rain, winds, storms, frost, or heat, so as to maintain all work, materials, apparatus, and fixtures, free from injury or damage. At the end of the day's work, all new work likely to be damaged shall be covered.

# 8. WEATHER CONDITIONS

The Contractor shall protect all portions of his work and all materials, at all times from damage by water, freezing, frost and is to repair, replace and make good to the satisfaction of the Architect, any portion of same which may in the Architect's opinion, have been damaged by the elements.

# 9. GRADES, LINES, LEVELS, AND SURVEYS

The Owner will establish the lot lines, restrictions and a bench mark. All other grades, lines, levels, and bench marks shall be established and maintained by the General Contractor, who shall be responsible for same. The General Contractor shall verify all grades, lines, levels, and dimensions as shown on the Drawings and he shall report all errors or inconsistencies in the above to the Architect before commencing work.

- A. The General Contractor shall provide and maintain well-built batter boards at all corners. He shall establish bench marks in not less than two (2) widely separated places. As the work progresses, he shall establish bench marks at each floor, giving exact levels of the various floors.
- B. As the work progresses, the General Contractor shall lay out in the forms and the rough flooring the exact location of all partitions as a guide to all trades.
- C. The General Contractor shall verify all grades, lines, levels, and dimensions as shown on the Drawings and he shall report any errors or inconsistencies in the above to the Architect before commencing work.

# 12. REQUIREMENTS IMMEDIATELY AFTER EXECUTION OF CONTRACT

Immediately after execution of the Contract, the Contractor shall deliver to the Architect the following items which are described more fully in following Articles:

Schedule of Values Schedule of Operations Progress Charts Samples Superintendent's name and resume of experience List of Subcontractors and Material Suppliers

- A. Schedule of Values on AIA Form G702, or other form approved by the Architect, a detailed breakdown of the Contract Sum indicating the amounts allotted to the various divisions of the work for labor and material. The schedule will serve as a guide to the Architect in determining the amounts due each month as the work progresses. The schedule shall be broken down as directed by the Architect.
- B. Schedule of Operations based on the above Schedule of Values and indicating the progress of the work up to the first day of each month shall be prepared by the Contractor in a form approved by the Architect and shall be delivered to the Architect in duplicate with each application for payment.
- C. Progress Charts based on the above specified schedule of operations and indicating the progress of the work up to the first day of each month shall be prepared by the Contractor in a form approved by the Architect and shall be delivered to the Architect in duplicate with each

application for payment. Progress charts shall be in the form of a bar graph. Along with progress charts the Contractor shall provide an estimated monthly cash flow chart.

- 13. CONSTRUCTION PROCEDURE
  - A. Each Contractor shall schedule his work so as to cause a minimum of interference with business operations during all of the construction work.
  - B. Precautions and Cooperation
    - 1) Notify the Owner 7 days in advance before any utility (natural gas, water, electricity, or sewer) is to be interrupted.
    - 2) With proper notification, interruption in utilities up to 4 hours will be permitted without special provisions by the Contractor. \*If any interruption of a utility exceeds 4 hours the Contractor must make arrangements for temporary alternate utility service.
    - 3) Interruption of utilities must be coordinated with the Owner with changeovers and out of service at night. Weekend and evening changeovers of utilities shall occur with no additional cost to the Owner.
    - 4) Openings to be cut in existing exterior walls must be saw cut. No jackhammer work will be permitted. Notify the Owner 7 days in advance of cutting of exterior walls.

## 14. TIME EXTENSIONS ADVERSE WEATHER

- A. The Contractor shall comply with all provisions of the General Conditions in submitting any request for extension of Contract Time due to unusually severe weather.
- B. Definitions:
  - 1. <u>Adverse Weather</u> Atmospheric conditions at a definite time and place which are unfavorable to construction activities.
    - 2. <u>Unusually Severe Weather</u> Weather which is more severe than the adverse weather anticipated for the season, location, or activity involved.
- C. In order for any request of time extension due to unusually severe weather to be valid, the Contractor must document both of the following conditions.
  - 1. The weather experienced at the project site during the Contract period is more severe that the adverse weather anticipated for the project location during any given month.
  - 2. The unusually severe weather actually caused a delay to the completion of the project. The delay must be beyond the control and without fault or negligence by the Contractor.

D. The following schedule of monthly anticipated adverse weather delays will constitute the baseline for monthly weather time evaluations. The Contractor's Progress Schedule must reflect these anticipated adverse weather delays in all weather-affected activities:
MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON FIVE (5) DAY WORK WEEK.

JAN	<b>FEB</b>	MAR	<u>APR</u>	MAY	JUN	JUL	AUG	<u>SEP</u>	<u>OCT</u>	NOV	DEC
10	8	7	6	7	7	5	5	5	4	5	9

## END OF SECTION 01010

## SECTION 01019

## SPECIAL PROVISIONS

## 1. GENERAL

Should conflict occur between these Special Provisions and the General Conditions, the requirements of the Special Provisions shall take precedence.

## 2. TIME OF CONSTRUCTION – PENALTY CLAUSE

- a. <u>Time of Construction</u> The Contractor will commence the work within ten (10) days after the Architect shall have given the Contractor written notice to commence construction to the satisfaction of the Owner within the calendar days as stated in Paragraph 3, below. The time for completion herein set forth shall be extended for the period of any reasonable delay which is due exclusively to causes beyond the control and without the fault of the Contractor, including acts of God, fires, floods, and direction by the Architect. It is impractical to perform any operation of construction and acts of omissions of the Owner with respect to matters for which Owner is solely responsible; provided, however, that no such extension of time for completion shall be granted the Contractor, unless within ten (10) days after the happening of any event relied upon by the Contractor for such extension of time, the Contractor shall have made a request, therefore, in writing to the Architect. Extended time will be submitted with pay request for Owner's approval.
- b. <u>Penalty Clause</u> The time of completion of the construction of the project is of the essence of this Contract. Should the Contractor neglect, refuse, or fail to complete the project (100%) within the time herein agreed upon, after giving effect to extensions of time, if any, herein provided; the Owner shall have the right to deduct from and retain out of such money, which may then be due or which may become due and payable to the Contractor, the sum of THREE HUNDRED DOLLARS (\$300.00) per day for each and every day that such construction is delayed in its completion beyond the specified time. If the amount due and to become due from the Contractor to the Owner is insufficient to pay in full any such penalites, the Contractor shall pay to the Owner the amount necessary to effect such payment in full; provided, however, that the Owner shall promptly notify the Contractor for early completion.
- c. <u>Joint Responsibility</u> The General Contractor and/or Subcontractors causing the delay in completion of the project shall be responsible for payment of the penalty. In no case shall the total penalty for all contracts exceed the sum of daily penalty multiplied by the number of days of delay in completion.

## 3 WORK SEQUENCE, SCHEDULE FOR COMPLETION AND LIQUIDATED DAMAGES

a. Schedule requirements for each area are outlined as follows.

		Substantial	
Work	Available Start	Completion	Liquidated Damages
Renovation	November 1, 2023	April 1, 2024	\$300/Calendar Day

b. Schedule requirements for final completion – 14 days following substantial completion with liquidated damages equivalent to those identified for substantion completion.

- 4. ALTERNATES Refer to Alternate Schedule, Section 01030
  - a. Alternates specified are not a part of Base Bid, but are Alternates to same, their acceptance being at option of Owner.

## 5. CASH ALLOWANCES

- a. <u>Costs included in Allowances</u>: Cost of Product to Contractor or Subcontractor, less applicable trade discounts, delivery to site, except those taxes saved by use of Owner's tax exemption.
- b. <u>Costs Not Included in the Allowance</u>: Fees for overhead and profit, product handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage and labor for installation and finishing.
- c. <u>Architect Responsibilities</u>:
  - 1. Consult with Contractor in consideration and selection of Products, suppliers and installers.
    - 2. Select Products in consultation with Owner and transmit decision to Contractor.
  - 3. Prepare Proposal Requests and Change Orders.
- d. <u>Contractor Responsibilities</u>:
  - 1. Assist Architect/Engineer in selection of Products, suppliers and installers.
  - 2. Obtain proposals from suppliers and installers and offer recommendations.
  - 3. On notification of selection by Architect, execute purchase agreement with designated supplier and installer.
  - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.

- 5. Promptly inspect Products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- 6. Product handling at the site, including unloading, uncrating and storage, protection of Products from elements and from damage and labor for installation and finishing.
- 7. The Contractor shall include in their Bid all fees for all cash allowances.
- Funds will be drawn from Cash Allowances only by written authorization from Owner.
- f. Cash Allowances:

e.

- 1. Section 08710 Door Hardware. Note this allowance is to include hardware for doors and frames, excluding overhead doors. <u>Amount \$20,000.00.</u>
- 2. Section 10850 Building Specialties, Interior Building Signage. Amount \$10,000.00.
- Inspection and Testing Allowance The contractor shall include in their bid, an allowance of <u>\$10,000.00</u> for direct cost of testing by the approved testing companies. The contractor shall bear all costs associated with coordination, administration scheduling, and supervision of testing companies, and include those costs in their bid.
- 4. Section 09688 Carpet Glue Down. Carpet Allowance.
  - Walk-Off Carpet Type. This allowance to include purchase and delivery of carpet only. Amount \$45/sq. yard.
  - All other carpet areas: This allowance to include purchase and delievery of carpet only. **Amount \$32/sq. yard.**
- 5. Contingency Allowance In addition to the specification sections listed above, include an allowance of <u>\$30,000.00</u> in the general bid and contract amount to be included in the contractors base bid. This allowance shall be used at the sole discretion of the Architect and/or Owner specifically for hidden conditions discovered in the field or on site, the addition of labor, parts and/or materials required for timely completion in conjunction with the general scope of work.
- 6. ENUMERATION OF DRAWINGS AND SPECIFICATIONS
  - a. <u>Correlation</u>. Accompanying these Specifications are the Drawings, which jointly with these Specifications, are intended to explain each other and describe and coordinate the work to be performed under the Contract.
  - b. <u>Verification of Documents</u>. Before submitting their bid, each Bidder shall check their set(s) of Drawings and Specifications and advise the Architect if any sheets are missing.
  - c. <u>Specifications Explanations</u>. For convenience of reference, the Specifications are separated into Titled Divisions and Sections. Such separation shall not, however, operate to make the Architect an arbiter to establish limits between the Contractor and Subcontractor or Sub-Subcontractor.
  - d. <u>Drawings</u>. Refer to LIST OF DRAWINGS.
  - e. <u>Specifications</u>. Refer to TABLE OF CONTENTS.
- 7. WARRANTIES

Before being eligible for final payment, Contractor shall deliver to Owner, through Architect, all special warranties specified for materials, equipment and installation.

## 8. OPERATING INSTRUCTIONS

Before being eligible for final payment, Contractor shall deliver to Owner, through Architect, three (3) copies of manufacturer's operating and maintenance instructions, and one (1) CD/DVD containing complete set of manufacturers operating instructions, a complete set of shop drawings on each piece of equipment. Electronic files shall be in PDF format with files organized into single documents for Architectural, Mechanical, and Electrical divisions.

9. AS-BUILT DRAWINGS

Before being eligible for final payment, the Electrical and Mechanical Contractors shall prepare and deliver to Owner, through Architect, One (1) CD/DVD containing AS-BUILT DRAWINGS in PDF format. These drawings shall consist of marked-up prints, and shall show the correct location of every item of equipment, piping, conduit, panel boards, ductwork, switches, valves, etc. If marked-up prints are used, and scanned, they shall be new white prints without miscellaneous markings. All markings shall be clearly legible and identified.

## 10. CERTIFICATE OF COMPLIANCE

Upon completion of project, Contractor is to furnish written Certification to the Architect that they have complied with every paragraph of the Specifications and Drawings.

## 11. CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

Upon completion of project, Contractor shall submit to Owner a signed Contractor's Affidavit of Release of Liens <u>prior to final payment</u>.

## 12. CONTRACTOR'S MONTHLY APPLICATION FOR PAYMENT FORM

Contractor's monthly Application for Payment shall be submitted as per General Conditions. AIA Document G702, Application and Certificate for Payment is approved and acceptable.

## 13. FILING AND RECORDING OF BONDS

In addition to furnishing the number of combination Performance Bond and Labor and Materials Payment Bond, and Statutory Bond, if required, the Contractor shall file copies of such bonds with Clerk of the District Court and furnish Architect with receipt furnished by Clerk of the District Court, covering charges for filing and recording of said bonds.

## 14. STATUTORY BONDS

In addition to furnishing the combination Performance and Labor and Materials Payment Bond specified in General Conditions, the Contractor shall furnish Statutory Bond in an amount not less than 100% of the Agreement in such numbers and form stated in Sample Copy bound in the Specifications. Statutory Bond shall be filed and recorded with Clerk of the District Court, as specified in Paragraph - FILING AND RECORDING OF BONDS.

## 15. DOCUMENTS FURNISHED CONTRACTORS

The General Contractor will be furnished, free of charge, the following working drawings and specifications, including modifications for construction of the project - 20 sets. The General Contractor will be responsible for distribution of these sets to the Subcontractors and suppliers. The Contractor shall pay the actual cost of reproduction and postage for all additional sets requested by them.

## 16. TESTING AND INSPECTIONS

- a. The General Contractor shall be responsible for coordination and scheduling of all inspections and testing as required by the Contract documents. The Contractor shall include a testing and inspection allowance in their bid as described in paragraph 5.f.3 of this section. The Contractor shall pay all costs associated with testing and all direct costs from the testing/inspection company and shall be deducted from the testing and inspection allowance. Re-testing/ inspection costs associated with incorrect or defective work shall be paid by the Contractor and such costs are not to be deducted from the allowance.
- b. All sampling and testing procedures shall be performed by the inspection company responsible for inspection and testing.

## 17. SALES TAX EXEMPTIONS

a. Materials and equipment incorporated into this project <u>are not exempt</u> from the payment of sales tax under the laws of the State of Kansas and such sales tax <u>shall be included in the Bid</u> of the Bidder.

## END OF SECTION 01019

## SECTION 01030

## ALTERNATES

## PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

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

## 1.3 GENERAL

- 1. The General Contractor shall state in his Bid Form the amount of dollars to be ADDED or DEDUCTED from his Base Bid for the following Alternates.
- 2. Alternates are not in order of acceptance.
- 3. It shall be the responsibility of the General Contractor to advise all necessary personnel and suppliers as to the nature and extent of all alternates selected by the owner.
- 4. Circle Add or Deduct to indicate that the alternate price is to be added or subtracted from the base bid.

## 1.4 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

## 1.5 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

## 3.1 SCHEDULE OF ALTERNATES

1. ALTERNATE NO. 1

Contractor shall state the amount of dollars to be added or deducted to the base bid to remove the existing fireplace and chimney in its entirety. Price shall include all plan and finish revisions, structural roof infill, etc. as indicated on the drawings.

Add/Deduct \$ \_\_\_\_\_

2. ALTERNATE NO. 2 Contractor shall state the amount of dollars to be added to the base bid to perform all work associated with the added west parking stalls, including all grading, paving, striping, retaining wall, etc. for complete and finished parkings stalls and building access.

Add/Deduct \$ \_\_\_\_\_

3. ALTERNATE NO. 3

Contractor shall state the amount of dollars to be added or deducted to the base bid to west drive-thru canopy and associated structure, and all associated building components. Price shall include all associated roof framing patch, roofing, gutter, fascia, wall patch, etc. for complete removal and finish work.

Add/Deduct\$

4. ALTERNATE NO. 4 Contractor shall state the amount of dollars to be added to the base bid to remove the existing frieze trim at the building perimeter and replace with new EIFS Banding as indicated on the drawings.

Add/Deduct\$ \_\_\_\_\_

 ALTERNATE NO. 5 Contractor shall state the amount of dollars to be added to the base bid to install sterilization cabinetry at Sterilization room 119 as indicated on the drawings.

Add/Deduct\$ \_\_\_\_\_

6. ALTERNATE NO. 6 (If added by Addendum)

Add/Deduct\$\_\_\_\_\_

7. ALTERNATE NO. 7 (If added by Addendum)

Add/Deduct\$

END OF SECTION 01030

# SECTION 013516

# ALTERATION PROJECT PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Section includes special procedures for alteration work.

## 1.2 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

# 1.3 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, General Contractor will conduct conference at Project site.
  - 1. Attendees: In addition to representatives of Owner, **General Contractor**, Architect, and Contractor, shall be represented at the meeting.
  - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
    - a. Fire-prevention plan.
    - b. Governing regulations.
    - c. Areas where existing construction is to remain and the required protection.
    - d. Hauling routes.
    - e. Sequence of alteration work operations.
    - f. Storage, protection, and accounting for salvaged and specially fabricated items.
    - g. Existing conditions, staging, and structural loading limitations of areas where materials are stored.

- 3. Reporting: General Contractor will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at **bi-weekly** intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
  - 1. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
  - 2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

# 1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

# 1.5 QUALITY ASSURANCE

- A. Title X Requirement: For Facilities built prior to 1978 Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
  - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
  - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

# 1.6 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
  - 1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
  - 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area **designated by Owner**.
  - 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
  - 1. Repair and clean items for reuse as indicated.
  - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
  - 3. Protect items from damage during transport and storage.

- 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.
- D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
  - 1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
  - 2. Secure stored materials to protect from theft.
  - 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.

# PART 2 - PRODUCTS - (Not Used)

## PART 3 - EXECUTION

## 3.1 **PROTECTION**

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
  - 1. Use only proven protection methods, appropriate to each area and surface being protected.
  - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
  - 3. Erect temporary barriers to form and maintain fire-egress routes.
  - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
  - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
  - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
  - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
  - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.
- B. Temporary Protection of Materials to Remain:
  - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
  - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
  - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
  - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.

- 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
  - 1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
  - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

# 3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
  - 1. Comply with NFPA 241 requirements unless otherwise indicated.
  - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
    - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
  - 1. Obtain Owner's approval for operations involving use of **open-flame or** welding or other high-heat equipment. Notify Owner **at least 72 hours** before each occurrence, indicating location of such work.
  - 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
  - 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
  - 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  - 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  - 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
    - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than **30 minutes** after conclusion of work **in each area** to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
    - e. Maintain fire-watch personnel at **each area of** Project site until **60 minutes** after conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.
- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
  - 1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

# 3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

# 3.4 GENERAL ALTERATION WORK

- A. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation **photographs**. Comply with requirements in Section 013233 "Photographic Documentation."
- B. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- C. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
  - 1. Do not proceed with the work in question until directed by Architect.

# TEMPORARY FACILITIES AND CONTROLS

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

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

# 1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

# 1.4 USE CHARGES

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

# 1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

# 1.6 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.

# 1.7 **PROJECT CONDITIONS**

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

# PART 2 - PRODUCTS

# 2.1 MATERIALS

- Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section.
- C. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- E. Paint: Comply with requirements in Division 9 painting Sections.

# 2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

- Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep Β. office clean and orderly. Furnish and equip offices as follows:
  - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
  - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack board.
  - Drinking water and private toilet. 3.
  - Coffee machine and supplies. 4
  - Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 5. deg F (20 to 22 deg C).
  - Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height. 6.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - Store combustible materials apart from building. 1.

#### EOUIPMENT 2.3

- Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations A. and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, selfcontained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filters at air grille in system. Before Substantial Completion, all units and ductwork shall be thoroughly cleaned and restored to new condition.

#### SIGN AND ADVERTISING 2.4

- The General Contractor shall furnish and erect one (1) painted sign, 8 x 12 in size, as shown on the A. last page of this Section and placed where directed. Sign shall show the following:
  - Name of Project 1.
  - Name, Logo, and Address of Architect 2.
  - Name, Logo, and Address of General Contractor 3.
  - Name of Mechanical Subcontractor 4.
  - 5. Name of Electrical Subcontractor
- Β. Post entire construction area with DANGER and NO TRESPASSING signs to comply with safety and insurance regulations.
- Keep premises clear and free from other signs or posters. C.

# **PART 3 - EXECUTION**

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

#### TEMPORARY UTILITY INSTALLATION 3.2

- General: Install temporary service or connect to existing service. A.
  - Arrange with utility company, Owner, and existing users for time when service can be 1. interrupted, if necessary, to make connections for temporary services.
  - Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- B. Connect temporary sewers to municipal system as directed by authorities having jurisdiction. 1. C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. 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.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Use of Owner's existing electric power service will be permitted, Coordination is required to provide power when new service is installed.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  - 2. Install lighting for Project identification sign.
    - a. Principal subcontractors' field and home offices.
  - 3. Provide superintendent with cellular telephone for use when away from field office.
- I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail. Cellular e-mail service is acceptable.

# 3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

B.

- 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
- 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- 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.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. 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 nor endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
  - 1. Provide temporary, directional signs for construction personnel and visitors.
  - 2. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- H. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.
- I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- J. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

# 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Division 1 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 2 Section "Site Clearing" and Erosion Control drawings.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  - 2. Reference erosion control drawings for additional requirement.
- D. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: **Before construction operations begin**, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As indicated on Drawings.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. **Provide Owner with one set of keys.**
- H. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. 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 not complete, insulate temporary enclosures.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
  - 2. Insulate partitions to provide noise protection to occupied areas.
  - 3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
  - 4. Protect air-handling equipment.
  - 5. Weather strip openings.
  - 6. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.
  - 1. Prohibit smoking in completed facilities.
  - 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.

# 3.5 OPERATION, TERMINATION, AND REMOVAL

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

- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  - 3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Reference General Conditions.

# SITE CLEARING

# PART 1 - GENERAL

### 1.01 SECTION INCLUDES

- A. Remove surface debris.
- B. Remove paving, curbs, and improvements.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove root system of trees and shrubs.
- F. Topsoil excavation.

### 1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable local codes and ordinances for disposal of debris, burning debris on site, use of herbicides, etc.
- B. Coordinate clearing Work with utility companies as required.

### PART 2 – PRODUCTS

Not Used

# PART 3 – EXECUTION

### 3.01 PREPARATION

A. Verify that existing plant life designated to remain, is tagged, or identified.

### 3.02 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect bench marks and existing structures from damage or displacement.

# 3.03 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving, curbs, and improvements designated.
- C. Remove trees and shrubs indicated. Remove stumps, root system surface rock and other areas indicated or implied for completion of the project.
- D. Clear undergrowth and deadwood, without disturbing subsoil. Strip and clear vegetation from areas designated to be filled, excavated, regraded, or landscaped.

# 3.04 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

# 3.05 TOPSOIL EXCAVATION

- A. Excavate clean topsoil from areas to be further excavated, filled, re-landscaped, or regraded.
- B. Stockpile in area designated on site to depth not exceeding 8 feet. Protect from erosion. Remove excess topsoil not being reused, from site.

### SOIL MATERIALS

# PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Subsoil and topsoil materials.
- 1.2 RELATED SECTIONS
  - A. Document: N/A

# 1.3 REFERENCES

- A. ANSI/ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ASTM D2487 Classification of Soils for Engineering Purposes.

# PART 2 PRODUCTS

# 2.1 SOIL MATERIALS

- A. Note the Contractor shall over excavate new addition area at South entry. Minimum 2' below existing grade.
- B. Fill Material: Under slabs and within the zone of influence of foundation elements must be a material approved by the geotechnical engineer and as indicated in the geotechnical report.
- C. Fill and Backfill Material: Other areas, foundation backfill, site grading, and pavement, should be clean site material or similar borrow material, approved by the geotechnical Engineer. Foreign matter shall be limited in size to 1 ½ " in greatest dimension, and be limited to no more than 5% by volume or weight.
- D. Topsoil: Incorporate topsoil into subsoil 3"- 4". Topsoil should be blended and contain the following components by percentage:

Organic Matter:	4 - 6 %
Sand (ASTM - 300 and 75% between .25mm and .75mm):	40 - 50%
Silt:	20 - 25%
Clay:	25 - 40%

# 2.2 SOURCE QUALITY CONTROL

- A. Inspection and testing will be performed by an independent laboratory, Contractor shall bear all related costs under provisions of General Requirements.
- B. Tests and analysis of soil material will be performed in accordance with ANSI/ASTM D698.
- C. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

# PART 3 EXECUTION

# 3.1 STOCKPILING

- A. Stockpile materials on site at locations indicated or in areas that will not impact project completion.
- B. Stockpile in sufficient quantities to meet project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

# 3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

# **ROUGH GRADING**

# PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Removal of topsoil and subsoil.
- B. Cutting, grading, filling, and rough contouring the site for site structures, building pads and paving.
- 1.2 RELATED SECTIONS
  - A. Document: N/A

# PART 2 - PRODUCTS

# 2.1 MATERIALS

A. Topsoil, Fill and Structural Fill: As specified in Section 02205.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

# 3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities. Locate, identify, and protect utilities that remain, from damage. Notify utility company to remove and relocate utilities.
- C. Protect above and below grade utilities that remain.
- D. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

# 3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Stockpile in area designated on site to depth not exceeding 8 feet. Protect from erosion. Remove subsoil not being reused, from site.
- C. When excavating through roots, perform work by hand and cut roots with sharp axe.

# 3.4 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill materials on continuous layers and compact in accordance with Schedule at end of Section.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 inches in 10 ft. unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Remove surplus fill materials from site.

# 3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot.

# 3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the General Requirements.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
- C. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no additional cost to the Owner.

# 3.7 SCHEDULES

A. Reference Soils Report, 4.2.3 Compaction Requirements Topsoil Fill:

#### EXCAVATING

# PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Excavating for building foundations and footings.
- B. Excavating for slabs-on-grade, paving, landscaping.
- C. Excavating for site structures and utilities.

# 1.2 RELATED SECTIONS

- A. Document: N/A
- PART 2 PRODUCTS Not Used

### PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Locate, identify, and protect utilities that remain, from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- E. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

### 3.2 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work.
- B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving and site structures, construction operations.
- C. Machine slope banks to angle of repose or less, until shored.
- D. Do not interfere with 45 degree bearing splay of foundation unless shoring has been installed.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Hand trim excavation. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- H. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- I. Correct areas over-excavated in accordance with Section 02223.
- J. Stockpile excavated material in area designated on site and remove excess material not being reused, from site.
- K. Shoring or Bracing will be required on the north and east wall of the new structure adjacent to the existing building. See the Geotechnical Report for recommendations.

# 3.3 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of the General Requirements.
- B. Provide for visual inspection of bearing surfaces.

# 3.4 **PROTECTION**

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

# BACKFILLING

# PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade, paving.
- D. Consolidation and compaction as scheduled.
- E. Fill for over-excavation.
- 1.2 RELATED SECTIONS
  - A. Document: N/A
- 1.3 **REFERENCES** 
  - A. ANSI/ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

# PART 2 - PRODUCTS

- 2.1 FILL MATERIALS
  - A. Fill: As specified in Section 02205.

# PART 3 - EXECUTION

- 3.1 EXAMINATION
  - A. Verify subdrainage, dampproofing or waterproofing installation has been inspected and completed.
- 3.2 PREPARATION
  - A. Compact subgrade to density requirements for subsequent backfill materials.
  - B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with fill and compact to density equal to or greater than requirements for subsequent fill material.
  - C. Scarify and proof roll subgrade surface to a depth of 8 to 12 inches to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

# 3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Fill, Place and compact materials in continuous layers not exceeding 8 inches in compacted depth.
- D. Employ a placement method that does not disturb or damage other work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- F. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- G. Slope grade away from building minimum 2 inches in 10 ft. unless noted otherwise.
- H. Make gradual grade changes. Blend slope into level areas.
- I. Remove surplus backfill materials from site.
- J. Leave fill material stockpile areas free of excess fill materials.

# 3.4 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

# 3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the General Requirements.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no additional cost to the Owner.
- D. Proof roll compacted fill surfaces under slabs-on-grade, and paving.

# 3.6 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of the General Requirements.
- B. Reshape and re-compact fills subjected to vehicular traffic.

# 3.7 SCHEDULE

- A. Interior Slab-On-Grade:
  - 1. Fill compacted to 98 percent of standard Proctor.
  - 2. Cover with Sand Fill 2 inches thick, compacted to 95 percent.
- B. Exterior Side of Foundation Walls Retaining Walls and Over Granular Filter Material and Foundation Perimeter Drainage:
  - 1. Fill to subgrade elevation, each lift, compacted to 90 percent (minimum) of standard Proctor.
- C. Fill Under Grass Areas:
- 1. Fill to 4 inches below finish grade.
- D. Fill Under Asphalt or Concrete Paving:
  - 1. Compact subsoil to 95 percent of its maximum dry density.
- E. Fill to Correct Overexcavation:
  - 1. Lean concrete to minimum compressive strength of 1000 psi.
  - 2. Compact approved fill to 95 percent of its maximum dry density.

# TRENCHING

# PART 1 GENERAL

# 1.01 SECTION INCLUDES

- A. Excavating trenches for utilities from 5 feet outside building to municipal utilities.
- B. Compacted fill from top of utility bedding to subgrade elevations.
- C. Backfilling and compaction.
- 1.02 RELATED SECTIONS
  - A. Document: N/A

# 1.03 REFERENCES

- A. ANSI/ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- 1.04 FIELD MEASUREMENTS
  - A. Verify that survey bench mark and intended elevations for the Work are as shown on drawings.

# 1.05 COORDINATION

- A. Coordinate all work as required.
- B. Verify work associated with lower elevation utilities are complete before placing higher elevation utilities.
- PART 2 PRODUCTS
- 2.01 FILL MATERIALS
  - A. Fill: As specified in Section 02205.

# PART 3 EXECUTION

# 3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- C. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment, and vehicular traffic.
- D. Maintain and protect above and below grade utilities which are to remain.
- E. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with fill and compact to density equal to or greater than requirements for subsequent backfill material.
- 3.02 EXCAVATION
  - A. Excavate subsoil required for utilities to municipal utilities.
  - B. Cut trenches sufficiently wide to enable installation and allow inspection.
  - C. Do not interfere with 45 degree bearing splay of foundations.
  - D. Hand trim excavation. Remove loose matter.
  - E. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
  - F. Correct areas over excavated in accordance with Section 02222.
  - G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

# 3.03 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

- C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation perimeter drainage, conduit, or pipes in trench.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Remove surplus fill materials from site.
- H. Leave fill material stockpile areas completely free of excess fill materials.
- 3.04 TOLERANCES
  - A. Top Surface of Backfilling: Plus or minus 1 inch from required elevations.
- 3.05 FIELD QUALITY CONTROL
  - A. Field inspection and testing will be performed under provisions of the General Requirements.
  - B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
  - C. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to the owner.
- 3.06 PROTECTION OF FINISHED WORK
  - A. Protect or reshape and recompact fills subjected to vehicular traffic during construction.

### PORTLAND CEMENT CONCRETE PAVING

#### PART 1 GENERAL

1.1 SECTION INCLUDESA. Concrete sidewalks, parking lot, ramps, stairs, curbs, and curb cuts.

### 1.2 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking and light duty commercial vehicles.

# 1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, requirements of Sections 03100, 03200 and 03300.
- B. Obtain cementitious materials from same source throughout.

### 1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

### PART 2 PRODUCTS

### 2.1 FORM MATERIALS

- A. Wood or Steel form material, profiled to suit conditions.
- B. Joint Filler: ANSI/ASTM D1751 type; 3/4 inch thick.

### 2.2 REINFORCEMENT

- A. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185; 6x6-W2.9 x W2.9 in flat sheets or coiled rolls; unfinished.
- B. Reinforcing Steel: ASTM A615; 40 or 60 ksi yield grade; deformed billet steel bars; unfinished.

#### 2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150 Air Entraining Type IA Portland type, natural color.
- B. Fine and Coarse Mix Aggregates: ASTM C33.
- C. Water: Potable, not detrimental to concrete.
- D. Air Entrainment: ASTM C260.
- E. Chemical Admixture: ASTM C494, as approved by Architect.

# 2.4 CONCRETE MIX - BY PERFORMANCE CRITERIA

- A. Mix concrete in accordance with, ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Provide concrete to the following criteria:
  - 1. Compressive Strength: Reference schedule below.
    - 2. Slump: 3 to 4 inches.
    - 3. Air Entrained: 5 percent.
- C. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by Architect/Engineer.
- E. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

### 2.5 SOURCE QUALITY CONTROL

- A. Submit proposed mix design of each class of concrete to the architect and appointed testing laboratory firm for review prior to commencement of work.
- B. Tests on cement and aggregates shall be performed to ensure conformance with specified requirements.

# PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Verify compacted subgrade, granular base and stabilized soil is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

# 3.2 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manholes, catch basins, and frames with oil to prevent bond with concrete pavement.
- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

# 3.3 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

# 3.4 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels and reinforcement to achieve pavement and curb alignment as detailed.
- D. Provide doweled joints 12 inch o.c. at interruptions of concrete.

# 3.5 PLACING CONCRETE

- A. Place concrete in accordance with ACI301.
- B. Ensure reinforcement, inserts, embedded parts, and are not disturbed during concrete placement.
- C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to indicated pattern.

# 3.6 JOINTS

- A. Place 1/2 inch expansion joints at 30 foot intervals. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/4 inch for sealant placement by Section 07900.
- C. Provide scored or sawn joints at 10 feet intervals U.N.O. at sidewalks and curbs and 100 square feet at all pavement.
- D. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

# 3.7 FINISHING

- A. Sidewalk Paving: Light broom, radius to 1/4 inch and trowel joint edges.
- B. Handicapped Ramps: Reference ADA.
- C. Curbs and Gutters: Trowel finish.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- E. Parking: Light Broom.

# 3.8 FIELD QUALITY CONTROL

- A. Three concrete test cylinders shall be taken for every 100 or less cu yds of each class of concrete placed each day.
- B. One additional test cylinder shall be taken during cold weather and cured on site under same conditions as concrete it represents.
- C. One slump test shall be taken for each set of test cylinders taken.

# 3.9 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

# 3.10 SCHEDULES

- A. Concrete sidewalks and integral curb and gutter: 4,000psi 28 day concrete, 4 inches thick, 6x6 – W1.4 x W1.4 W.W.F. reinforced, natural color Portland cement, broom finish, detectable warnings per ADA at ramps and curb cuts.
- B. Concrete Parking and Drive: 4,000 psi 28 day concrete, 6 inches thick, 6x6 W2.9 x W2.9
   W.W.F. reinforced, natural color Portland cement, broom finish. Paving shall be placed over 6" crushed rock/concrete compacted to 95%.

### CONCRETE FORMWORK

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing, and anchorage.
- B. Openings for other work.
- C. Formaccessories.
- D. Form stripping.

### 1.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site per the suppliers and/or manufacturer's recommendations.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

#### 1.3 COORDINATION

- A. Coordinate this Section with other Sections of work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

### PART 2 PRODUCTS

### 2.1 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

### 2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

### 2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable or Snap-off type, metal, size, and shape to minimize filling, waterproofing, and refinishing concrete surfaces.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfer, exposed edges 1/2 inch unless otherwise noted or detailed on the drawings.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, release tape sealed slots, anchors for securing to concrete formwork.
- E. Flashing Reglets: Galvanized steel 22 gage thick, longest possible lengths, with alignment splines for joints, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Waterstops: Rubber Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

# PART 3 EXECUTION

#### 3.1 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

#### 3.2 EARTH FORMS

A. Earth forms if permitted, hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

#### 3.3 ERECTION – FORMWORK

A. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams joists columns and exposed decorative concrete edges.
- G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

### 3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Position recessed reglets for brick veneer masonry anchors to spacing and intervals specified in Section 04300.
- E. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

#### 3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

# 3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301. Construct and align formwork for elevator hoistway in accordance with ANSI/ASME A17.1.

# 3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

#### 3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

# CONCRETE REINFORCEMENT

# PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Reinforcing steel bars, wire fabric, and accessories for cast-in-place concrete.

### 1.2 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

### 1.3 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301 – Specifications for Structural Concrete for Buildings, and ACI 318 – Building Code Requirements for Reinforced Concrete.

### 1.4 COORDINATION

A. Coordinate with placement of formwork, formed openings and other Work.

### PART 2 PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 40 or 60 ksi yield grade as indicated on the drawings; deformed billet steel bars, unfinished.
- B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 40 or 60 as indicated on the drawings; steel bars or rods, unfinished.
- C. Welded Steel Wire Fabric: ASTM A815; in flat sheets or coiled rolls; unfinished.

### 2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

#### 2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice. Locate reinforcing splices not indicated on drawings, at point of minimum stress.

# PART 3 EXECUTION

#### 3.1 PLACEMENT

E.

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on the drawings or if not indicated as follows:

Item		Coverage
Beams		1 1/2 inch
Column Ties		1 1/2 inch
Walls (expose	d to weather or backfill)	2 inch
Footings and C	Concrete Formed Against Earth	3 inch
Slabs on Fill	e	3/4 inch

# CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Cast-in-place concrete floors, foundation walls, and footings.
- B. Floors and slabs on grade.
- C. Control, expansion, and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads.

### 1.2 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data:
  - 1. Provide data on joint devices, attachment accessories.
  - 2. Product data on nonshrink grout.
- C. Samples: Submit 2-inch long samples of expansion/contraction joint.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.
- E. Concrete Mix Design Proportions.
  - 1. Submit as specified in Part 2, Paragraph 2.05 H. Mix Proportions, this section, before placing concrete.
  - 2. Submit for each mix design.
  - 3. Resubmit for any change in mix design.
  - 4. Submit back-up test data for each mix design

#### 1.3 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of embedded utilities and components which are concealed from view.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI301.
- B. Acquire cement and aggregate from same source for all work.
- C. Conform to ACI 305R when concreting during hot weather.
- D. Conform to ACI 306R when concreting during cold weather.

#### 1.5 COORDINATION

A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

# PART 2 - PRODUCTS

#### 2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I Normal or Type III High Early Strength.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean, potable, and not detrimental to concrete.

#### 2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A Water Reducing, Type B Retarding, Type C Accelerating, Type D Water Reducing and Retarding, Type E Water Reducing and Accelerating.

# 2.3 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion, polyvinyl acetate, Latex emulsion, two component modified epoxy resin, non-solvent two component polysulfide epoxy, mineral filled polysulfidepolymer epoxy, mineral filled polysulfide polymer epoxy resin, or Polyamid cured epoxy as approved.
- B. Vapor Barrier: 15 mil. thick clear polyethylene film, type recommended for below grade.
- C. Non-Shrink Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- D. Curing Compound: Liquid membrane-forming compound conforming to ASTM C 309, Type 1. Curing compound used on floors to be sealed, painted, tiled, or covered with resilient floor covering shall be guaranteed not to interfere with application of sealers, paint, tile mortar, or tile adhesive after 28-day curing period.

# 2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler:
  - 1. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.
  - 2. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency
- recovery of 95 percent if not compressed more than 50 percent of original thickness.
  B. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric, vinyl, or neoprene, filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum or vinyl cover plate, of longest manufactured length at each location, recess mounted; color as selected.
- C. Sealant: Rubber or synthetic rubber compound.

# 2.5 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301.
- C. Provide concrete with compressive strength of 3,500 psi at 28 days.
- D. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- E. Use calcium chloride only when approved by Architect/Engineer.
- F. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.
- G. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
- H. Mix Proportions.
  - 1. Concrete shall be homogeneous, readily placeable, and uniformly workable; proportioned to conform to ACI 211.1.
  - 2. Mix proportions for all concrete shall be selected preferably on the basis of field experience, but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design. Designs shall conform to ACI 301.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

# 3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Use forms for all concrete except footings may be earth formed. Adequately brace and stiffen forms to prevent deflection and settlement.

# 3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 304.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion, and contraction joints are not disturbed during concrete placement.
- D. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by sealant applied between overlapping edges and ends or taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- G. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- I. Install joint devices in accordance with manufacturer's instructions.
- J. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- K. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- L. Install joint covers in longest practical length, when adjacent construction activity is complete.
- M. Apply sealants in joint devices in accordance with Section 07900.
- N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- O. Place concrete continuously between predetermined expansion, contraction, and construction joints.
- P. Do not interrupt successive placement; do not permit cold joints to occur where possible.
- Q. Place floor slabs in saw cut pattern indicated, not to exceed areas larger than 200 sf. Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur (Usually required 4 to 12 hours after finishing).
- R. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.
- S. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavations.

# 3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed concrete walls columns beams joists with smooth rubbed finish.
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. Wood float surfaces which will receive quarry tile, ceramic tile, or terrazzo with full bed setting system.
- D. Steel trowel surfaces which will receive carpeting, resilient flooring, seamless flooring, and thin set quarry tile or thin set ceramic tile.
- E. Steel trowel surfaces which are scheduled to be exposed.
- F. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot or as indicated on drawings.

# 3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 308.
- D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- F. Curing Compound: Cure with liquid membrane-forming compound conforming to ASTM C 309,

Type I. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on. Apply curing compound to all exposed surfaces immediately after removing form or after finishing concrete.

# 3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of the General Requirements.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. Three 6"x12" or four 4'x8" concrete test cylinders will be taken for every 75 or less cu yds of each class of concrete placed. Test the additional 4"x8" cylinders at 28 days.
- E. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. One slump test will be taken for each set of test cylinders taken.
- G. Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added, the concrete shall be remixed for a minimum of 25 revolutions. Three concrete test cylinders will be taken from every truck that water is added to at the jobsite.

# 3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections as directed or in accordance with ACI 301.

# 3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

# MORTAR AND MASONRY GROUT

# PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Mortar and grout for masonry.

# 1.2 GENERAL

A. All notes or specifications on structural drawings shall override any discrepancies listed.

# 1.3 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Include design mix, indicate whether the Proportion or Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

# 1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

# 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type I, natural color, or color to be selected at exposed areas.
- B. Masonry Cement: ASTM C91, Type S, natural color, or color to be selected at exposed areas.
- C. Premix Mortar: ASTM C387, Type S, natural color, or color to be selected at exposed areas.
- D. Mortar Aggregate: ASTM C144, standard masonry type.
- E. Hydrated Lime: ASTM C207, Type S.
- F. Water: Clean and potable.
- G. Bonding Agent: Latex or Epoxy type.

# 2.2 MORTAR COLOR

A. Mortar Color: Match existing.

# 2.3 MORTAR MIXES

- A. Mortar For Load Bearing Walls and Partitions: ASTM C270, Type M or S using the Property specification.
- B. Mortar For Non-Load Bearing Walls and Partitions: ASTM C270, Type M or S using the Property specification.
- C. Mortar For Engineered Masonry: ASTM C270, Type M or S using the Property specification.
- D. Pointing Mortar: ASTM C270, Type N or O using the Property specification.

# 2.4 MORTAR MIXING

A. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.

- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-onehalf hours at temperatures under 40 degrees F.
- 2.5 GROUT MIXES
  - A. Bond Beams, and Lintels: 2,000 psi strength at 28 days; 8-10 inches slump; premixed type in accordance with ASTM C476.
  - B. Engineered Masonry: 2,000 psi strength at 28 days; 8-10 inches slump; premixed type in accordance with ASTM C476.

# 2.6 GROUT MIXING

- A. Mix grout in accordance with ASTM C476.
- B. Add admixtures in accordance with manufacturer's instructions; mixuniformly.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Request inspection of spaces to be grouted.
- 3.2 INSTALLATION
  - A. Install mortar and grout in accordance with premix mortar manufacturer's instructions.
  - B. Install mortar and grout in accordance with ASTM C270 and C476.
  - C. Work grout into masonry cores and cavities to eliminate voids.
  - D. Do not install grout in lifts greater than 16 inches or two CMU courses without consolidating grout by rodding.
  - E. Do not displace reinforcement while placing grout.
  - F. Remove excess mortar from grout spaces.

# 3.3 FIELD QUALITY CONTROL

- A. Test and evaluate mortar in accordance with ASTM C780.
- B. Test and evaluate grout in accordance with ASTMC1019.

### UNIT MASONRY SYSTEM

# PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Concrete masonry and brick units.
- B. Reinforcement, anchorage, and accessories.

### 1.2 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data: Provide data for masonry and brick units and fabricated wire reinforcement.

### 1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Accept units on site. Inspect for damage.

### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.
- C. Hot Cold Weather Requirements: IMIAC Recommended Practices and Guide Specifications for Hot or Cold Weather Masonry Construction.

# PART 2 PRODUCTS

# 2.1 CONCRETE MASONRY UNITS

- A. Hollow Non-Load Bearing Block Units (CMU): All exterior exposed concrete masonry units and mortar shall contain integral water repellent. Units shall comply with ASTM C 33 and ASTM C 90, grade N water permanence per ASTM E 514 test. Wind driven protection per ASTM E 514-74, Class E. Full wall flexural bond strength per ASTM E 72-74 all interior concrete masonry shall be grade S, Type I, moisture controlled units.
- B. Size and Shape: Nominal modular size of 4, 6, 8 x 16 x 8 inches.

# 2.2 BRICK UNITS

- A. Face Brick: Kansas brick and tile texture, to match existing. Color blend to match cloud ceramics blend at Student Center. Coordinate with Keith Naegele (785) 820-1333 at Salina Concrete Products.
- B. Size and Shape: Nominal modular size of  $4 \ge 8 \ge 2/3$  inches.

#### 2.3 REINFORCEMENT AND ANCHORAGE

- A. Single and Multiple Wythe Joint Reinforcement: Truss type; steel wire, hot dip galvanized to ASTM A641 after fabrication, No. 9 side rods with No. 9 cross ties. Manufacturers:
  - a) DUR-O-WALL
  - b) TRU-MESH
  - c) BET-R-WALL
- B. Reinforcing Steel: ASTM A615, 40 or 60 ksi yield grade, deformed billet bars, uncoated finish.
- C. Wall Ties: Corrugated wall ties, 22 ga., hot dip galvanized to ASTM A123 steel finish,
  - HB-213 Dur-O-Wall Anchor or Equal.

Manufacturers:

- a) DUR-O-WALL
- b) TRU-MESH
- c) BET-R-WALL

# 2.4 MORTAR AND GROUT

A. Mortar and Grout: As specified in Section 04100.

# 2.5 FLASHINGS

- A. Thru-Wall Flashings: Asphalt fabric backed copper, 3-5 oz.
- B. Lap Sealant: Butyl type as specified in Section 07900.

# 2.6 ACCESSORIES

- A. Preformed Control Joints: Rubber, Neoprene, Polyvinyl chloride material. Provide with corner and tee accessories, heat or cement fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride, polyethylene, polyurethane or rubber; oversized 50 percent to joint width; self-expanding.
- C. Building Paper: TYVEK Commercial wrap.
- D. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- E. Weeps: Locate at 32" o.c.
- F. Weep Vent: Open weave polyester mesh; insect resistant, hold back from face <sup>1</sup>/<sub>4</sub>".
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- H. Cavity wall Mortar Net: 90% open area, 10" H, 1" wide, 18" minimum density PVC or nylon material set behind bottom brick courses between brick and flashing around all exterior veneer walls.

# 2.7 LINTELS

A. As detailed on drawings.

# PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

# 3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- 3.3 COURSING
  - A. Establish lines, levels, and coursing indicated. Protect from displacement.
  - B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
  - C. Concrete Masonry Units:
    - 1. Bond: Running unless otherwise indicated.
    - 2. Coursing: One unit and one mortar joint to equal 8 inches.
    - 3. Mortar Joints: Concave, unless noted otherwise.
  - D. Brick Units:
    - 1. Bond: Running, unless noted otherwise.
    - 2. Coursing: Three units and three mortar joints to equal 8 inches.
    - 3. Mortar Joints: Concave, unless noted otherwise.
- 3.4 PLACING AND BONDING
  - A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, or bitumen damp proofing is applied.
- I. Isolate masonry partitions from vertical structural framing members with a control joint.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

# 3.5 WEEPS

- A. Install weeps in veneer at 32 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls, and under precast concrete window sills. Hold weep screens back from face 1/4 ".
- 3.6 CAVITY WALL
  - A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.
  - B. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor barrier adhesive.
  - C. Install 10" High x 1" Thick x continuous "Mortar Net" cavity drainage fabric.
  - D. Install 90% open weave polyester weep vents at 32" o.c. and at weep locations above windows and doors.

# 3.7 REINFORCEMENT AND ANCHORAGE

- A. Install horizontal joint reinforcement 16 inches o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. At masonry veneer, attach wall ties to metal studs at back-up wall at maximum 24 inches o.c. vertically and 16 inches o.c. horizontally. Place at maximum 3 inches o.c. each way around perimeter of openings, and within 12 inches of openings.
  - 1. At top of CMU veneer, field bend and extend galvanized tie minimum 1" into CMU cavity and grout solid. Space at 16" o.c. Provide appropriate length of wall tie to extend into CMU

# 3.8 MASONRY FLASHINGS

- A. Extend flashings horizontally at foundation walls, above ledge or shelf angles and lintels, under parapet caps, and at bottom of walls.
- B. Turn flashing up minimum 8 inches and bed into mortar joint of masonry, seal to concrete, seal or underlap at sheathing over framed back-up.
- C. Lap end joints minimum 6 inches and seal watertight.
- D. Turn flashing, fold, and seal at corners, bends, and interruptions.

## 3.9 LINTELS

- A. Install loose steel or precast concrete lintels over openings as indicated or detailed on the Structural.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
- C. Maintain minimum 8 inch bearing on each side of opening.

# 3.10 GROUTED COMPONENTS

- A. Reinforce bond beam as indicated or detailed.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

# 3.11 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch (6 mm) from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.
- C. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches to three CMU courses and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.
- I. High Lift Grouting:
  - 1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
  - 2. In double wythe walls, omit every second masonry unit in one of the wythes for clean out and cell inspection purposes.
  - 3. In double wythe walls, construct vertical grout barriers or dams between the masonry wythes, with masonry units every 30 feet maximum.
  - 4. Clean out masonry cells and cavities with high pressure water spray. Permit complete water drainage.
  - 5. Request inspection of the cells and cavities. Allow 3 days advance notice of inspection.
  - 6. After cleaning and cell inspection, seal openings with masonry units.
  - 7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
  - 8. Limit grout lift to 60 inches and rod for grout consolidation or mechanically vibrate. Wait 60 minutes before placing next lift.

# 3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joint in accordance with Section 07900 for sealant performance.
- E. Form expansion joint as detailed.

# 3.13 BUILT-IN WORK

- A. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, window frames, wood nailing strips, fireplace accessories, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.
- B. Install built-in items plumb and level.

- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build in organic materials subject to deterioration.
- 3.14 TOLERANCES
  - A. Maximum Variation From Alignment of Columns: 1/4 inch.
  - B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
  - C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
  - D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
  - E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
  - F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
  - G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- 3.15 CUTTING AND FITTING
  - A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
  - B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
- 3.16 MOCK-UP
  - A. Provide a 4 ft. by 4 ft. mock-up panel on the job site to be used as a standard for similar masonry construction on the project.
- 3.17 CLEANING
  - A. Remove excess mortar and mortar smears as work progresses.
  - B. Replace defective mortar. Match adjacent work.
  - C. Clean soiled surfaces with cleaning solution.
  - D. Use non-metallic tools in cleaning operations.

## 3.18 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

### METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

### A. Section Includes:

- 1. Miscellaneous steel framing and supports.
- 2. Shelf angles.
- 3. Metal ladders.
- 4. Metal floor plate [ and supports].
- 5. Structural-steel door frames.
- 6. Miscellaneous steel trim.
- 7. Metal bollards.
- 8. Loose bearing and leveling plates.
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
  - 3. Steel weld plates and angles for casting into concrete.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
  - 2. Fasteners.
  - 3. Shop primers.
  - 4. Shrinkage-resisting grout.
  - 5. Slotted channel framing.
  - 6. Manufactured metal ladders.
  - 7. Ladder safety cages.
  - 8. Metal bollards.
  - 9. Vehicular barrier cable systems.
  - 10. [Pipe] [Downspout] guards.
  - 11. Abrasive metal [nosings] [treads] [and] [thresholds].
- B. Sustainable Design Submittals:
- C. Shop Drawings: Show fabrication and installation details.[ Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.]
- D. Samples: For each type and finish of extruded [nosing] [and] [tread].

## PART 2 - PRODUCTS

- 2.1 METALS
  - A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes. B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

# 2.2 FASTENERS

- A. General: Unless otherwise indicated, provide [**Type 304**] stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless steel fasteners for fastening [aluminum] [stainless steel] [or] [nickel silver].
  - 2. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- C. Post-Installed Anchors: [Torque-controlled expansion anchors] [or] [chemical anchors].
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy [Group 1 (A1)] [Group 2 (A4)] stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

# 2.3 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with [Section 099113 "Exterior Painting."]
  [Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."]
  [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal weight, air-entrained concrete with a minimum 28-day compressive strength of 3500 psi.

# 2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:

- 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- 2. Obtain fusion without undercut or overlap.
- 3. Remove welding flux immediately.
- 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing [ and contour of welded surface matches that of adjacent surface].
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

# 2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fire-Resistance Rating: [As indicated].

# 2.6 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
  - 1. Provide mitered and welded units at corners.
  - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize [ and prime] shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with [zinc-rich primer.]
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-inplace concrete.

# 2.7 METAL LADDERS

- A. General:
  - 1. Comply with ANSI A14.3 [, except for elevator pit ladders].
  - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
  - 1. Space siderails [16 inches (406 mm)] apart unless otherwise indicated.
  - 2. Siderails: Continuous, [3/8-by-2-1/2-inch (9.5-by-64-mm steel flat bars, with eased edges.
  - 3. Rungs: [3/4-inch- (19-mm-) diameter] [3/4-inch- (19-mm-) square] [1-inch- (25-mm-) diameter] [1-inch- (25-mm-) square], steel bars.
  - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
- 2.8 METAL FLOOR PLATE
  - A. Fabricate from [abrasive-surface floor] plate of thickness indicated below:
    - 1. Thickness: [1/4 inch (6.4 mm)].
  - B. Provide [steel] angle supports as indicated.

C. Provide flush [steel] bar drop handles for lifting removable sections, one at each end of each section.

# 2.9 STRUCTURAL-STEEL DOOR FRAMES

- A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.
  - 1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
- B. Galvanize [exterior ] steel frames.
- C. Prime [exterior ] steel frames with [zinc-rich primer.]

# 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize [exterior ] miscellaneous steel trim.
- D. Prime [exterior ] miscellaneous steel trim with [zinc-rich primer.]
- 2.11 METAL BOLLARDS
  - A. Fabricate metal bollards from [Schedule 80 steel pipe] Retain subparagraph below if required; delete if bollards are concrete filled.
    - 1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel.
  - B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick, [steel] [stainless steel, ASTM A480/A480M, No. 4 finish] baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.
  - C. Fabricate sleeves for bollard anchorage from steel or stainless steel [pipe] with 1/4-inch- (6.4mm-) thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.
  - D. Prime steel bollards with [zinc-rich primer.]

# 2.12 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with [zinc-rich primer.] [primer specified in Section 099600 "High Performance Coatings."]
- 2.13 LOOSE STEEL LINTELS
  - A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
  - B. Galvanize [ and prime] loose steel lintels located in exterior walls.
  - C. Prime loose steel lintels located in exterior walls with [zinc-rich primer.]

- 2.14 STEEL WELD PLATES AND ANGLES
  - A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

# 2.15 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

# 2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items [ **not indicated to be galvanized**] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with [**universal shop primer**]
- C. Preparation for Shop Priming: Prepare surfaces to comply with [requirements indicated below:]
  - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
  - 5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

# PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections. C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

# 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for [ceiling hung toilet partitions] [operable partitions] [overhead doors] [and] [overhead grilles] securely to, and rigidly brace from, building structure.
- C. Anchor shelf angles securely to existing construction with [expansion anchors] [anchor bolts] [through bolts].
- D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

# 3.3 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with ANSI/AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire resistance rating indicated.

# 3.4 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards in concrete [with pipe sleeves preset and anchored into concrete] [in formed or core-drilled holes not less than 42 inches (1050 mm) deep and 3/4 inch (19 mm) larger than OD of bollard]. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.
- C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.

# 3.5 INSTALLATION OF VEHICULAR BARRIER CABLE SYSTEMS

A. Install vehicular barrier cable systems at locations indicated, mounted at heights indicated on Drawings above the parking surface. Anchor [wire ropes] [steel prestressing strand] to structural columns and walls and tension to withstand vehicle loading as specified in Performance Requirements" Article with no cable tensioned less than 3000 lbf (13.3 kN). Do not displace supporting components.

# 3.6 INSTALLATION OF BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

# 3.7 REPAIRS

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

# HANDRAILS AND RAILINGS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

A. Steel pipe and tube handrails, balusters, and fittings.

## 1.2 DESIGN REQUIREMENTS

A. Railing assembly, wall rails, and attachments to resist lateral force of 75 lbs. at any point without damage or permanent set.

## 1.3 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

### 1.4 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

## PART 2 PRODUCTS

## 2.1 STEEL RAILING SYSTEM

- A. Rails and Posts: As detailed and indicated on the drawings.
- B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
- C. Mounting: Adjustable brackets and flanges, with steel inserts for casting in concrete and/or steel brackets for embedding in masonry. Prepare backing plate for mounting in wall construction.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Splice Connectors: Steel concealed spigots, welding collars.

## 2.2 FABRICATION

- A. Fit and shop assemble components in largest practical sizes, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Continuously seal joined pieces by continuous welds.
- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Accurately form components to suit stairs and landings, to each other and to building structure.
- H. Exterior railings and associated fasteners shall be galvanized and field painted.

## PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

## 3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete and/or embedded in masonry, placed in partitions with setting templates, to appropriate Sections.

# 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide anchors, plates angles required for connecting railings to structure. Anchor railing to structure.
- D. Field weld anchors as indicated on Drawings. Touch-up welds with primer. Grind welds smooth.
- E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

# 3.4 ERECTION TOLERANCES

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

# ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

## A. Section Includes:

- 1. Framing with dimension lumber.
- 2. Framing with engineered wood products.
- 3. Shear wall panels.
- 4. Wood blocking and nailers.
- 5. Wood furring and grounds.
- 6. Wood sleepers.
- 7. Plywood backing panels.

# 1.2 ACTION SUBMITTALS

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

## 1.3 INFORMATIONAL SUBMITTALS

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

## 1.4 QUALITY ASSURANCE

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

## PART 2 - PRODUCTS

# 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

# 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  - 5. Wood floor plates that are installed over concrete slabs-on-grade.

# 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

- E. Application: Treat items indicated on Drawings, and the following:
  - 1. Plywood backing panels.

# 2.4 DIMENSION LUMBER FRAMING

- Non-Load-Bearing Interior Partitions: As indicated on the structural drawings.
  - 1. Application: Refer to structural drawings.
  - 2. Species:

A.

- a. Southern pine or mixed southern pine; SPIB.
- b. Northern species; NLGA.
- c. Eastern softwoods; NeLMA.
- d. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Partitions: As indicated on the structural drawings.
  - 1. Application: Refer to structural drawings.
  - 2. Species:
    - a. Southern pine; SPIB.
    - b. Douglas fir-larch (north); NLGA.

# 2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi
  - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi
- B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi.
  - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi for members with 18" depths or less and 2,200,000 psi for members with depths greater than 18".
- C. Laminated-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
- D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood joists at bearing ends.
  - 1. Material: made from solid lumber or laminated-strand lumber.
  - 2. Thickness: 1-1/4 inches.
  - 3. Provide performance-rated product complying with APA PRR-401, rim board, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

# 2.6 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. Furring.
  - 4. Grounds.
- B. For items of dimension lumber size, provide stud grade lumber or better of any of the following species:
  - 1. Southern pine; SPIB.
  - 2. Douglas fir-larch; WCLIB or WWPA.

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

# 2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or of Type 304 stainless steel.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Nails, Brads, and Staples: ASTM F 1667.
- D. Power-Driven Fasteners: NES NER-272.
- E. Wood Screws: ASME B18.6.1.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

# 2.8 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Simpson Strong-Tie Co., Inc.
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM 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), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.

# 2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

# PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

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

# 3.2 **PROTECTION**

A. Protect 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.

#### SHEATHING

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Gypsum wall sheathing.
  - B. APA rated (fire retardant treated) plywood at sloped metal accent roofs
  - C. Telephone and electrical panel boards.

#### 1.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Protect sheathing from warping or other distortion by stacking.

### PART 2 PRODUCTS

#### 2.01 SHEATHING MATERIALS

- A. Wall Sheathing
  - 1. Gypsum (typical) Fiberglass Mat Faced
    - a) Fire resistant, 5/8 inch, glass mat, Type "X" core.
    - b) Manufacturer Georgia Pacific Dens Glass Gold
- B. Structural Plywood Sheathing
  - 1. Exterior plywood, 5/8<sup>,7</sup> thick.
  - 2. APA rated for spans indicated on drawings
  - 3. Fire Retardant Treated.

#### 2.02 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing, galvanized. Reference requirements of Section 05400 Cold-Formed Framing.
  - 2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.
- B. Sill Gasket on Top of Foundation Wall: Contractor submit for approval by Architect.
- C. Building Paper: Tyvek Commercial Wrap at Plywood sheathed walls.

#### PART 3 EXECUTION

#### 3.01 FRAMING

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Place horizontal members flat, crown side up.
- D. Construct load bearing framing and curb members full length without splices.

#### 3.02 SHEATHING

- A. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.
- B. Place building paper horizontally over wall sheathing, weather lap edges, and ends.
- C. Install telephone and electrical panel boards with plywood sheathing material where required. Over size the panel by 12 on all sides.

#### 3.03 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum, and 1/2 inch maximum in 30 feet.

## WOOD BLOCKING

# PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Blocking in wall and roof openings.
  - B. Wood furring and grounds.
  - C. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, and wood trim.
  - D. Telephone and electrical panel boards.

# PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Miscellaneous Blocking: Minimum stud grade.
- B. Blocking at electrical devices, and lights Fire retardant treated.
- C. Plywood: APA Rated Sheathing, Grade C-D; Exposure Durability 1; sanded.
- D. Roof Curbs and Cants: Treated lumber.

# 2.2 ACCESSORIES

A.

- Fasteners and Anchors:
  - 1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

# PART 3 EXECUTION

## 3.1 FRAMING

- A. Set members level and plumb, in correct position.
- B. Place horizontal members flat, crown side up.
- C. Construct curb members of single pieces.
- D. Space framing and furring 16 inches o.c.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinate curb installation with installation of decking and support of deck openings, roofing vapor retardant, and parapet construction.

# 3.2 SHEATHING

- A. Secure sheathing to framing members with ends over firm bearing and staggered.
- B. Install telephone and electrical panel boards with plywood sheathing material where required. Over size the panel by 12 inches on all sides.

## FINISH CARPENTRY

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Finish carpentry items, other than shop prefabricated casework.
- B. Hardware and attachment accessories.
- 1.2 QUALITY ASSURANCE
  - A. Perform work in accordance with AWI Custom.

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Protect work from moisture damage.

### 1.4 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.

### 1.5 COORDINATION

A. Coordinate the work with plumbing and electrical rough-in, and installation of associated and adjacent components.

### PART 2 PRODUCTS

#### 2.1 LUMBER MATERIALS

- A. Softwood Lumber: Graded in accordance with AWI Custom; Reference schedule at the end of this section; <u>Select White Birch</u>, maximum moisture content of 6 percent; suitable for transparent finish.
- B. Paint Grade Materia: Poplar or similar, free of knots and grain, Sanded smooth for paint finish. Brush marks at base and trim are not acceptable.

## 2.2 SHEET MATERIALS

- A. Exterior Plywood: Exposed to weather shall be group 1, Exterior type, Grade A-B or A-C as required for exposure.
- B. Interior Plywood: Interior or Exterior type, Group 1 or 2, Grade B-D where concealed, Grade A-C one side exposed and Grade A-A two sides exposed.
- C. Wood Particleboard: ANSI A208.1 Type 1; AWI standard, composed of wood chips, medium density, made with high waterproof resin binders; of grade to suit application; sanded faces.
- D. Exterior HardiePanel; fiber cement panels.

#### 2.3 FASTENERS

A. Fasteners: Of size and type to suit application; Galvanized finish in concealed locations and Brass or Chrome finish in exposed locations.

## 2.4 FABRICATION

- A. Fabricate to AWI Custom standards.
- B. Shop assemble work for delivery to site, permitting passage through building openings.
- C. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

# 2.5 SHOP FINISHING

- E. Sand work smooth and set exposed nails and screws.
- F. Apply wood filler in exposed nail and screw indentations.
- G. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- H. Seal, stain, and varnish exposed to view surfaces. Brush apply only.
  - 1. Prime paint. Seal surfaces in contact with cementitious materials.

## PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify adequacy of backing and support framing.
  - B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### 3.2 INSTALLATION

- A. Install work in accordance with AWI Custom Quality Standard.
- B. Set and secure materials and components in place, plumb, and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install components trim with nails, screws, bolts with blind fasteners or wall adhesive by gun application.
- E. Install hardware in accordance with manufacturer's instructions.

## 3.3 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

## 3.4 PREPARATION FOR SITE FINISHING

- A. Site Finishing: Refer to Section 09900.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

## 3.5 SCHEDULE

- A. Interior: Wood base, wood wall trim, wood window trim and sill, wood door trim, where incicated: 5/8" thick material with varying widths (reference drawings). <u>Paint Grade</u>
- B. Slat Wall: Birch veneer, stain finish. Size as indicated on drawings.

# CUSTOM CASEWORK

# PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Countertops, base and wallcabinets.
- B. Cabinet hardware.
- C. Prefinished surfaces and preparation for site finishing.
- D. Preparation for installing utilities.

### 1.2 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.
- 1.3 QUALIFICATIONS
  - A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years' documented experience.
- 1.4 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, store and handle products to site.
  - B. Protect units from moisture damage.

### 1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as on shop drawings.
- 1.6 COORDINATION
  - A. Coordinate the work with plumbing and electrical rough-in.

## PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Salina Planning Mill.
  - B. Custom Wood Products
  - C. Kitchens Inc.
  - D. Technique Manufacturing
  - E. Substitutions: Under provisions of the General Requirements.

## 2.2 WOOD MATERIALS

A. Softwood Lumber: FS MM-L-736; graded in accordance with AWI Premium Grade; average moisture content of 6 percent; species and grade as follows: Select White Birch, to match. Edging & trim where indicated and detailed.

# B.

2.3 SHEET MATERIALS

A. Hardwood Plywood: S 51; graded in accordance with AWI, core materials of veneer, and lumber, type of glue recommended for application; face veneer and cuts as follows:

ITEM	FACE SPECIES
Drawer 'Box' Construction	Melamine (unless noted otherwise) - Per AWI Premium Grade.
Door Construction	Plastic Laminate (u.n.o.) - Per AWI Premium Grade.
Cabinet 'Body' Construction	Plastic Laminate at exposed (u.n.o.). Melamine at unexposed
	(u.n.o.) - Per AWI Premium Grade.
Backs	Plastic Laminate at exposed (u.n.o.). Melamine at unexposed
	(u.n.o.) - Per AWI Premium Grade.
Shelving	Melamine (u.n.o.) - Per AWI Premium Grade.
(Note: Full line of colors for all melamine selected by architect.)	

- B. High Performance particleboardCore:
  - 1. Particleboard to be <sup>3</sup>/<sub>4</sub>" thick of 45 lb. Density, and balanced construction withmoisture Content not to exceed 8%. All particleboards shall meet or exceed the requirements for its type and classification under Commercial Standard CS-236-66, Federal Specifications LLL-B-800A, and ASTM D 1037-78.
  - 2. Particleboard shall meet the following performance requirements. Submit compliance data from the manufacturer prior to fabrication:

471 lbs.
2,400 psi.
450,000 psi
90 psi.
900 lbs.

- C. Hardboard: Hardboard shall meet or exceed Commercial Standards CS-251 and Federal Specifications LLL-B-00810. Tempered hardboard ¼" thick, smooth both sides.
- 2.4 MANUFACTURERS PLASTIC LAMINATE
- A. Wilsonart, Formica, Pionite or Nevamar. (Full Line of all manufacturers including premium grade)

### 2.5 SOLID SURFACE MATERIALS

- A. LG Solid Surface Hi-Macs
  - 1.  $\frac{3}{4}$ " or 1" standard thickness with 1-1/2" thick eased edges.
  - 2. Color to be selected from full line of manufacturer's colors, price category (5) and below.
  - Equivalent product by Corian color to be selected including all colors to price category 5.
- C. Restroom vanity tops to be provided with integral lavatory sinks. Style equal to LG Single Sink 1612 Oval style sink, ADA compliant.

### 2.6 LAMINATE MATERIALS

- A. Plastic Laminate: AWI, 0.040 inch Post Forming 0.050 inch General Purpose quality; color, pattern, and surface texture as selected.
- B. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

#### 2.7 ACCESSORIES

B.

- A. Adhesive: FS MMM-A-130 contact adhesive, type recommended by AWI and laminate manufacturer to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; approved finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. PVC Edge Band: 3mm Color and Pattern matched to plastic laminated face. Typical at all doors, drawers, and open cabinet edges.

# 2.8 HARDWARE

- A. Hinges: Grass #3803 120° nickel finish.
- B. Pulls: Hafele, Amerock Allison, satin nickel, item no. 133.50.160
- C. Drawer Slides: Hafele, Accuride #3832SC.
- D. Adjustable shelf clips: Knape & Vogt, 3256 zinc finish.
- E. Cushion Bumpers: Hafele #356.21.428 clear. Two on each door & drawer.
- F. "Recessed" Adjustable shelf standards: Knape & Vogt, #255, zinc finish.
- G. Grommets: Hafele, Series #429, full range colors. Quantity (22). Locate per shop drawings review.
- H. Catches: Amerock, #9783 magnetic.
- 2.9 FINISHING MATERIALS
  - A. Stain, Varnish and Finishing Materials: As specified in Section 09900.

# 2.10 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

- B. Fit shelves, doors, and exposed edges with .3mm pvc. Pattern and color match to laminate cabinets. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. Door and Drawer Fronts: 3/4 inch thick; overlay style.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arrises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- H. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

# 2.11 FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler, which matches surrounding surfaces and of types recommended for applied finishes.
- D. Seal, stain and varnish exposed to view surfaces.
- E. Seal, stain and varnish internal exposed to view and semi-concealed surfaces. Seal surfaces in contact with cementitious materials.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify adequacy of backing and support framing.

# 3.2 INSTALLATION

- A. Set and secure casework in place; rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

## 3.3 ADJUSTING

A. Adjust moving or operating parts to function smoothly and correctly.

# 3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings and fixtures.

## 3.5 SCHEDULE

A. Adjustable shelving longer than 34" to be 1" thick.

# WATER REPELLENT COATING

## PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Water repellent coating applied to exterior and interior exposed brick and masonry units walls.
- 1.2 SYSTEM DESCRIPTION
  - A. Applied coating to repel moisture absorption in material being treated.
- 1.3 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, store, protect, and handle products to site.
  - B. Protect coating liquid from freezing.

## 1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not apply coating when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

# PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. HYDROZO Clear Double 7.
  - B. Substitutions: Under provisions of the General Requirements.
- 2.2 MATERIALS
  - A. Coating: Silane; containing 12 percent minimum solids.

## PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Verify joint sealants are installed and cured.
- B. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

## 3.2 PREPARATION

- A. Delay work until masonry mortar concrete substrate is cured a minimum of 5 days.
- B. Remove loose particles and foreign matter.
- C. Remove oil or foreign substance with a chemical solvent which will not affect coating.
- D. Scrub and rinse surfaces with water and let dry.

## 3.3 APPLICATION

- A. Apply coating in accordance with manufacturer's instructions.
- B. Apply at a rate of 80 sq. ft. per gallon by airless spray.
- C. Apply in one continuous, uniform coat.

## **BOARD INSULATION**

# PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Adhesive, sheet vapor and air barrier.
- B. Board insulation, Roofing, EPS & XPS.
- C. Board insulation at Brick Cavity walls.

### 1.2 REFERENCES

- A. ANSI/ASTM D2842 Water Absorption of Rigid Cellular Plastics.
- B. ASTM C578 Preformed Cellular Polystyrene Thermal Insulation.
- C. ASTM E96 Test Methods for Water Vapor Transmission of Materials.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements.
- B. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements.
- 1.4 SUBMITTALS
  - A. Product Data: Provide data on product characteristics, performance criteria, limitations.
  - B. Manufacturer's Installation Instructions: Indicate special environmental conditions required for installation, installation techniques.

### 1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

## PART 2 PRODUCTS

## 2.1 MANUFACTURERS - INSULATION MATERIALS

- A. Dow, & Dyplast Products
- B. Substitutions: Under provisions of the General Requirements.

## 2.2 ADHESIVES

A. Adhesive: Type recommended by insulation manufacturer for application.

#### 2.3 ACCESSORIES

- A. Tape: Polyethylene polyester self-adhering type, mesh reinforced, 2 inch wide.
- B. Insulation Fasteners: Impale clip of galvanized steel, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

## 2.4 ROOF INSULATION

A. Insulation, Roof: Dyplast Products, Expanded Polystyrene (EPS 15) Insulation Board Size: Maximum 48 x 96 inch Board Thickness: 1 inch min. thickness Tapered Density: .90-1.14 lb/ft3 Thermal Resistance: 3.8 minimum R value per inch Board Edges: Square Water Absorption: ASTM C272, less than 4% volume

- B. Insulation, Roof: Dow Products, Deckmate, Extruded Polystyrene Insulation Board: Board Size: Maximum 24 x 96 inch Board Thickness: 3 " min., ref drawings as indicated Density: D1621, 16 psi min. Thermal Resistance: 5 minimum R value per inch Board Edges: Shiplap Water Absorption: D2842, less than 0.9 % volume
- C. Insulation Wall Cavity: Dow Products, Cavitymate, Extruded Polystyrono

Polystyrene

Board Size:Maximum 16 x 96 inchBoard Thickness:1.5 " min., ref drawings as indicatedDensity:D1621, 15 psi min.Thermal Resistance:5 minimum Rvalue per inch Board Edges:Butt EdgeWater Absorption:D2842, less than 0.7 %volumeVolume

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify site conditions.
  - B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
  - C. Verify substrate surface is flat, free of honeycomb fin irregularities, materials or substances that may impede adhesive bond.

# 3.2 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Do not permit Work to be damaged prior to covering insulation.

# SECTION 07213 BATT INSULATION

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Batt insulation at exterior wall and roof locations.
- B. Batt insulation for filling perimeter window and door shim spaces, crevices in exterior wall and roof.
- C. Sound batt insulation at interior walls.
- D. Vapor retarder.

### 1.2 REFERENCES

- A. ASTM C665 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- B. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.

### 1.3 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure in conjunction with thermal insulating materials in Section 07212. Overlap insulations to ensure complete thermal envelope at all exterior surfaces.
- 1.4 COORDINATION
  - A. Coordinate the work with all related Sections for installation of vapor retarder and other forms of insulation.

## PART 2 PRODUCTS

- 2.1 MANUFACTURERS INSULATION MATERIALS
  - A. OWENS-CORNING FIBERGLASS Product thermal batt insulation. Class A rated.
  - B. Substitutions: Under provisions of the General Requirements.
- 2.2 MATERIALS
  - A. Batt Insulation: ASTM C665; preformed glass fiber batts; loose laid and taped, conforming to the following:
    - 1. Thermal Resistance: R-19 at walls.
    - 2. Batt Size: 6" Walls per exterior walls. 12" (R38) at Roof insulation and above ceilings
    - 3. Facing: Foil Faced
  - B. Sound Batt Insulation:
    - 1. Batt size: 3" and 6".
    - 2. Facing: Unfaced.
  - C. Tape: Self-adhering type as recommended by the manufacturer, mesh reinforced, 2 inches wide.

## PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify that substrate, adjacent materials, and insulation are dry and ready to be installed.

## 3.2 INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- D. Install with applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane, caulk, or tape.
- E. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
## EXTERIOR INSULATION AND FINISH SYSTEM

# PART 1 GENERAL

## 1.01 SECTION INCLUDES

- A. Composite wall cladding of rigid insulation and applied coating.
- B. Coating applied directly to concrete masonry units (CMU).
- 1.02 RELATED SECTIONS
  - A. Section 7900 Joint Sealants
  - B. Section 06112 Sheathing

# 1.03 REFERENCES

- A. ASTM C578 Preformed Cellular Polystyrene Thermal Insulation.
- B. ASTM D2842 Water Absorption of rigid Cellular Plastics.
- C. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.
- D. EIMA Class PB (Exterior Insulation Manufacturers Association) Guideline Specification for Exterior Insulation and Finish.

## 1.04 SUBMITTALS

- A. Submit under provisions of General Requirements.
- B. Shop Drawings: Indicate wall joint patterns, joint details, and molding profiles.
- C. Product Data: Provide data on system materials, product characteristics, performance criteria, and limitations.
- D. Samples: Submit one 4 x 4-inch size sample illustrating coating texture range for selection.
- E. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

## 1.05 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum of 5 years' documented experience, and approved by manufacturer.

# 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install finish when ambient temperature is below 40 degrees F, 5 degrees C.
- B. Maintain this temperature during and 24 hours after installation of finish.

## 1.07 WARRANTIES

- A. Contractor, installer, and manufacturer shall warranty installed system for a period of 10 years beginning from the Date of Substantial Completion against all of the conditions indicated below. When notified in wiring from the Owner, Contractor, installer, and manufacturer shall promptly, and without inconvenience and cost to the Owner, correct said deficiencies in accordance with the requirements of the General Conditions of the Contract for Construction, Paragraph 12.2.
  - 1. Faulty material and workmanship
  - 2. Water infiltration
  - 3. Peeling, cracking, flaking, chipping, discoloration, or excessive fading of finish coating
  - 4. Failure of bond to substrate

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. DRYVIT Refer to schedule for system types.
- B. Acceptable Manufacturers of Exterior Finish and Insulation System (EIFS):
  - 1. Dryvit Systems, Inc.
  - 2. Senergy, Inc.
  - 3. Sto. Industries
  - 4. Thro Systems Products
- C. Substitutions: Under provisions of General Requirements.

#### 2.02 **MATERIALS**

- A. Molded Polystyrene Board Insulation: Bead type, conforming to the following:
  - Thermal Resistance: R of 3.7, RSI of 0.65. 1.
  - Thickness: 1", 1 <sup>1</sup>/<sub>2</sub>", 2", or as indicated on Drawings.
     Thickness tolerance: 1/32 maximum.

  - 4. Board Size: 48 x 96 inch.
  - 5. Board Size Tolerance: 1/16 inch
  - 6. Compressive Strength: Minimum 10 psi.
  - 7. Water Absorption: In accordance with ASTM D2842 percent by volume maximum.
  - 8. Edges: Square edges
  - 9. Flame / smoke properties: In accordance with ASTM E84.
- B. Air Barrier/Weather Barrier: Manufacturer approved acrylic coating preventing air and moisture infiltration.
- C. Primer Adhesive: Recommended by manufacturer. Applied with vertical grooves to allow drainage behind insulation.
- Coating Reinforcement: Glass fiber mesh type, woven, treated for improved bond with coating. Areas D. below elevation 110'-0" shall be "High Impact" and receive additional mesh reinforcing to achieve an EIMA Impact Classification of Level 4. Contractor shall submit installation method and test data regarding impact classification.
- E. Coating: Synthetic composition - Fine Sand Texture (Similar to Cast Stone), color as selected.

#### 2.03 ACCESSORIES

- Insulation Fastening: Fastenings with washers. Fasteners shall be galvanized, non corrosive. A.
- B. Trim and Control Joints: As recommended by manufacturer.
- C. Sealant Materials: Recommended by coating manufacturer.
- Drainage and drip: Manufacture's standard plastic drainage drips and track at all terminations. D.

# PART 3 EXECUTION

#### 3.01 **EXAMINATION**

- A. Verify site conditions under provisions of General Requirements.
- B. Verify that substrate and adjacent materials are dry.
- Verify substrate surface is flat, free of fins or irregularities. C.
- Verify substrate joints are taped and waterproofed prior to weather barrier coating installation D.

#### 3.02 **INSTALLATION – INSULATION**

- Install insulation in accordance with manufacturer's instructions including all flashings, drip edges, A. control joints, expansion joints, etc.
- Install boards on wall surface with long edges oriented horizontally. B.
- Place boards in a method to maximize tight joints. Stagger vertical joints. Butt edges and ends tight C. to adjacent board and to protrusions. All joints shall be mesh reinforced and sealed with waterproofing tape.
- D. Secure boards to substrate by mechanical attachment to achieve a continuous flush insulation surface.
- Install waterproofing tape at all insulation joints at window and door penetrations. E.

#### 3.03 **INSTALLATION - COATING**

- Install primer/adhesive coating and glass fiber mesh reinforcement in accordance with manufacturer's A. instructions. Installation shall be complete in a minimum of two passes. There shall be no visible mesh.
- B. Apply primer/adhesive coating to a minimum thickness as recommended by manufacturer.
- C. Lap reinforcement edges and ends 2 inches.
- Install trim and control joints. D.
- Install trim in full lengths only to minimize moisture intrusion; cut horizontal trim tight to vertical E. trim.
- F. Apply finish to a total minimum thickness as recommended by manufacturer.

#### 3.04 PROTECTION OF FINISHED WORK

Protect finished Work under provisions of General Requirements. A.

B. Do not permit finish surface to become soiled or damaged.

# 3.05 SCHEDULE

A. Type I – Outsulation Plus System over existing CMU or sheathing, located at all areas.

## FLUID-APPLIED, VAPOR-PERMEABLE MEMBRANE AIR BARRIERS

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. A 40 mil thickness fluid-applied vapor-permeable membrane of synthetic polymer, fire retardant composition for use as an air and water resistive barrier in exterior walls.
- B. Monolithic, fully-adhered membrane and accessory products installed as a continuous air and water resistive barrier assembly over substrates of the Project's opaque walls as indicated on Drawings
- C. Air and water resistive barrier assembly providing air and water tight coverage over these conditions
  - 1. Joints between building materials such as sheathing joints, mortar joints and dissimilar materials.
  - 2. Joints around windows, curtain walls, louvers, door frames and other service openings
  - 3. Junctions between walls and floors, between walls at building corners and between walls, roofs and ceilings.
  - 4. Mechanical and electrical penetrations
  - 5. Fastener and hardware penetrations used to attach insulation, cladding, trim or other overburden
  - 6. Termination at footing, roof deck and existing construction
  - 7. Junction to air & water barrier in roof, below grade or other adjacent systems
- D. Air and water resistive barrier assembly providing air and water tight coverage while accommodating designed movement at expansion and control joints.

### 1.02 REFERENCES

- A. ASTM C 920 Standard Specification for Elastomeric Joint Sealants
- B. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- C. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.
- D. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
- E. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- F. International Code Council Evaluation Services (ICC-ES) Acceptance Criteria for Water Resistive Coatings used as Water Resistive Barriers over Exterior Sheathing AC-212, Approved February 2015
- G. National Fire Protection Association (NFPA) 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

### 1.03 PERFORMANCE REQUIREMENTS

- A. Installed product and accessories shall exhibit an air leakage rate, infiltration and exfiltration modes, measured after pressure cycling, not to exceed 0.2 L/s\*m<sup>2</sup> at 75 Pa [0.040 CFM/ft<sup>2</sup> at 1.57 PSF] according to ASTM E 2357.
- B. Product shall meet the water vapor transmission requirement water resistive coatings used as water resistive barriers: minimum 35 g/m<sup>2</sup>/24h (5 Perms), tested to ASTM E 96 water method (B), ICC-ES AC-212, Section 4.4
- C. For Type I, II, III, and IV construction: Installed product and accessories shall be tested to NFPA 285 and pass in wall assemblies of the Project or shall pass by engineering judgement.
- D. Installed product and accessories shall be recommended by manufacturer for at least 180 days of outdoor exposure.
- E. Installed product and accessories shall have an upper service temperature limit of 180°F or higher.
- F. Manufacturer shall provide product and accessories which have a minimum installation temperature of 25°F or lower.
- G. Product shall be of fire-retardant, non-asphalt synthetic polymer composition.
- H. Product shall be minimum 0.040 inch (40 mils) dry thickness membrane. Dry membrane thickness shall be calculated based on field-measured wet mil thickness using a comb gauge and volume % solids of the product. [Example 66% solids membrane applied at minimum 60 wet mils yields a minimum 40 mil thickness membrane].
- 1.04 SUBMITTALS
  - A. Shop drawings showing locations and extent of air barrier and details of all typical conditions.
  - B. Manufacturer's technical data sheets and safety data sheets for product and accessories.

- C. Manufacturer's installation instructions.
- D. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.
- E. Free film sample of product at representative cured thickness, minimum 2 inch by 3 inch size.
- F. Sample of sheet detail flashing and transition membrane, minimum 2 inch by 3 inch size.

# 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.
- B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.
- C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
- D. Field-Constructed Mock-Ups: Prior to installation on Project, apply product and accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:

   Apply in field-constructed mockups of assemblies as specified in [Section 01 43 39 Mockups]

# 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by manufacturer.
- C. During cold weather, protect product in containers and spray equipment from freezing. Maintain product temperature within acceptable range for spray application, as required by air barrier manufacturer.
- D. Avoid spillage. Immediately notify Owner, [Architect] [Consultant] if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

# 1.07 PROJECT CONDITIONS

- A. Do not apply product or accessories during rain or accumulating snowfall.
- B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer's literature.
- C. Do not apply product or accessories over incompatible materials.
- D. Observe safety and environmental measures indicated in manufacturer's SDS, and mandated by federal, state and local regulations.
- 1.08 WARRANTIES: Provide the manufacturer's minimum five year material warranty.

# PART 2 PRODUCTS

- 2.01 PRODUCTS AND MANUFACTURERS :
  - A. Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website http://www.carlisleccw.com
    - 1. Fire Resist Barritech VP, for installation at 40 degrees F and above
    - 2. Fire Resist Barritech VP LT, for installation at 15 degrees F and above
- 2.02 ACCESSORIES: Provide from same manufacturer as air barrier membrane.
  - A. Sheet Detail Flashing: Foil composite faced rubberized asphalt flashing, minimum 0.040 inch (40 mils) thickness.
    - 1. Fire-Resist 705 FR-A or Fire-Resist 705 FR-A LT low temperature application formula by Carlisle Coatings & Waterproofing, Incorporated
    - 2. Others as approved by air barrier membrane manufacturer
  - B. Contact Adhesive:
    - Carlisle Coatings & Waterproofing, Incorporated: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant Solvent-Based, CCW-702 WB Water-Based, CAV-GRIP<sup>™</sup> Aerosol Spray or Travel-Tack portable aerosol spray cans
    - 2. Others as approved by air barrier membrane manufacturer

- C. Liquid Detail Flashing. Silane-terminated polyether, minimum 90% solids. ASTM C 920 Type S, Grade NS, Class 25, Use NT. 0.040 inch (40 mil) thickness application
  - 1. Barribond
  - 2. Others as approved by air barrier membrane manufacture
  - Detail Sealant:

D.

I.

В.

- 1. Barribond by Carlisle Coatings & Waterproofing, Incorporated
- 2. Others as approved by air barrier membrane manufacturer
- E. Transition Membrane:
  - 1. CCW SURE-SEAL Pressure-Sensitive Elastoform by Carlisle Coatings & Waterproofing, Incorporated
  - 2. Others as approved by air barrier membrane manufacturer
- F. Transition Membrane Primer:
  - 1. Carlisle Coatings & Waterproofing, Incorporated: SURE-SEAL HP-250 Primer, SURE-SEAL EP-95 Splicing Cement or SURE-SEAL Low VOC EPDM Primer
  - 2. Others as approved by air barrier membrane manufacturer
- G. Reinforcing Fabric: Woven, synthetic polymer fabric
  - 1. DCH Reinforcing Fabric by Carlisle Coatings & Waterproofing, Incorporated
  - 2. Others as approved by air barrier membrane manufacturer
- H. Glass Mat: Randomly-oriented glass strands held in binder soluble in wet air barrier membrane. Offered in rolls of various widths
  - 1. LiquiFiber
  - 2. Others as approved by air barrier membrane manufacturer
  - Fill Compound: 2-part, non-sag polyurethane sealant
    - 1. Carlisle Coatings & Waterproofing, Incorporated: CCW-703 V or CCW-201
    - 2. Others as approved by air barrier membrane manufacturer

# 2.03 RELATED MATERIALS BY OTHERS

- A. Silicone Sealant, select any:
  - 1. Dow 758, 790, 791, 795
  - 2. Pecora AVB Silicone, 890, 891, 895
  - 3. GE Silpruf, Silpruf LM
  - 4. Other product approved by air barrier membrane manufacturer
  - Polyurethane Foam Sealant, select any:
    - 1. TVM Fireblock Foam
    - 2. Fomo Handifoam Fireblock
    - 3. Great Stuff PRO or Froth Pack by Dow Chemical Company
    - 4. Other product approved by air barrier membrane manufacturer
- C. Insulation Adhesive, select any
  - 1. Barribond
  - 2. LM 800 XL
  - 3. QB-300 Multi-Purpose Construction Adhesive by OSI
  - 4. PL-300 VOC Foamboard Adhesive by Loctite
  - 5. Other product approved by air barrier membrane and board foam insulation manufacturer

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.
- C. Concrete shall be cured for a minimum of seven days. It shall be smooth, with sharp protrusions such as form joints or fins removed and ground flush. Honeycomb and holes/cracks shall be filled with grout or mortar.
- D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.
- E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

- F. Mortar joints shall be struck flush and shall be free of voids. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.
- G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer's requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer's requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.
- H. Plywood, OSB, lumber or pressure-treated wood moisture content, measured with a wood moisture meter in the core of the substrate, shall be below 20%.
  - Inform Architect in writing of
    - 1. Unsatisfactory substrates
    - 2. Cracks in concrete and masonry.
    - 3. Gaps or obstructions such as steel beams, angles, plates, and projections which cannot be spanned or covered by Product or Accessories.
    - 4. Anticipated problems applying product and accessories over substrate.
- 3.02 SURFACE PREPARATION
  - A. Fill cracks, gaps, and joints with fill compound, detail sealant or other material approved by air barrier manufacturer.
  - B. Fill rough gaps around pipe, conduit, and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.
  - C. Apply a <sup>3</sup>/<sub>4</sub> inch cant of fill compound or detail sealant at the intersection of the base of the wall and the footing.
- 3.03 DETAILING

I.

- A. Additional materials and installation are required at joints, transitions, openings, terminations, penetrations and similar surface irregularities. Perform detailing before or after product installation.
- B. Install product and accessories in details as directed in manufacturer's literature.
- C. Sheathing joints, use one of the following methods:
  - 1. 4 inch reinforcing fabric imbedded in product and centered over joint.
  - 2. 2" width liquid flashing centered over joint.
- D. Sheathing inside and outside corners. Flashing or reinforcement shall bear 3 inches minimum onto either side of angle change. Use any of the following methods:
  - 1. Sheet detail flashing
  - 2. Liquid detail flashing centered over angle change
  - 3. Reinforcing fabric centered over angle change and imbedded in product
  - 4. Glass mat centered over angle change and imbedded in product
- E. Window openings. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall return into window opening according to Project drawings. Use any of the following materials:
  - 1. Sheet detail flashing
  - 2. Liquid detail flashing
  - 3. Glass mat imbedded in product
- F. Pipe or duct penetrations. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall bear onto pipe or duct 3 inches, or according to Project drawings. Select any:
  - 1. Sheet detail flashing
  - 2. Liquid detail flashing
  - 3. Glass mat imbedded in product
- G. Expansion or deflection joints. Flashing shall bear 3 inches minimum onto either side of joint. Select any:
  - 1. Sheet detail flashing bellows or expansion bulb
  - 2. Transition membrane expansion bulb
- H. Interface of dissimilar substrates: Flashing or reinforcement shall bear 3 inches minimum onto either side of joint. Select any:
  - 1. Sheet detail flashing
  - 2. Liquid detail flashing
  - 3. Reinforcing fabric imbedded in product
  - 4. Glass mat imbedded in product

I. Seal all terminations of sheet detail flashing with a 1 inch width X 0.040 inch (40 mils) thick ribbon of detail sealant, centered over termination.

# 3.04 INSTALLATION

- A. Apply product and accessories over opaque wall surfaces as indicated in Project drawings.
- B. Use the manufacturer's standard or low temperature formula product as required by the project conditions.
- C. Apply product by spray, roller, brush or other method as recommended by air barrier manufacturer. Apply product at specified wet mil thickness in accordance with air barrier manufacturer's requirements.
- D. Verify compliance with air barrier manufacturer's minimum required thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.
- E. Installation shall produce complete coverage of opaque substrates as indicated in Drawings.
- F. Product and accessories shall be fully-adhered to substrates. Defects such as holes, fishmouths, blistering, de-lamination, bridging or thin spots shall be repaired according to air barrier manufacturer's instructions.

# 3.05 SCHEDULE

- A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space, before proceeding with air barrier installation.
- B. Seal penetrations made through installed product according to manufacturer's instructions and drawings.
- C. Seal fenestration to product with detail membrane, transition membrane, detail sealant, silicone sealant or polyurethane foam sealant according to Project drawings
- D. Through-wall flashing may be installed before or after product. Seal termination of through-wall flashing to product according product manufacturer's instructions.
- E. Exterior cladding shall be installed after product.
- F. Rigid or semi-rigid insulation installed over product shall be attached with mechanical fastening, insulation adhesive or a combination of these techniques, according to insulation manufacturer and air barrier manufacturer's instructions.
- G. Sequence Work to enable air barrier continuity at wall-to-foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies, and other conditions as indicated in Project drawings.

## 3.06 REPAIR AND PROTECTION

- A. Protect from damage during application and remainder of construction period.
- B. Inspect and make necessary repairs before covering. Repair or replace damaged material according to manufacturer's literature.
- C. Product and accessories are not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.
- D. Outdoor exposure of installed product and accessories shall not exceed 180 days.

## SHEET METAL FLASHING AND TRIM

# PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Cap and sill flashings.
- B. Counter flashings at roof mounted equipment and vent stacks.
- C. Miscellaneous flashings and closure pieces.

## 1.2 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

# 1.3 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA standard details and requirements.

## 1.4 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal flashing work with three years documented experience.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the General Requirements.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

## PART 2 PRODUCTS

## 2.1 SHEET MATERIALS

- A. Pre-Coated Galvanized Steel: ASTM A446, Grade A, G90 zinc coating; 24 gage core steel, exposed flashings shall be shop prefinished with Signature 300, KYNAR 500 coating of color as selected.
- B. Pre-Coated Aluminum: ASTM B209-14, 26gage equivalent (.47mm), Etched and primed for factory paint finish. Color to be selected from manufacturer's full range. Provide special/custom fabrication for curved profile. Located at arched entry wall, and curved entry canopy. Kerfed and spliced copings, and edge trim is not acceptable at these locations.

# 2.2 ACCESSORIES

- A. Fasteners: Galvanized steel with soft neoprene washers.
- B. Underlayment: ASTM D2178, No. 15 asphalt saturated roofing felt.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc chromate type.
- E. Sealant: Polyurethane type, specified in Section 07900.
- F. Bedding Compound: Rubber-asphalt type.
- G. Plastic Cement: ASTM D4586, Type II.
- H. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape.

## 2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of metal, same material as sheet, interlockable with sheet.
- C. Form pieces in longest possible lengths. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam and/or solder for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

# 2.4 FINISH

A. Exposed metal shall be pre-finished with Kynar finish color to be selected.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

## 3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

# 3.3 INSTALLATION

- A. Conform to drawing details included in the SMACNA manual unless otherwise indicated on the drawings.
- B. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

# JOINT SEALERS

## PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Preparing substrate surfaces.
- B. Sealant and joint backing.
- 1.2 QUALITY ASSURANCE
  - A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
  - B. Perform acoustical sealant application work in accordance with ASTM C919.

# 1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum years documented experience.
- 1.4 WARRANTY
  - A. Provide five year warranty.
  - B. Warranty: Include coverage for installed sealants and accessories which fail to achieve air tight seal, water tight seal, and exhibit loss of adhesion or cohesion, or do not cure.

# PART 2 PRODUCTS

## 2.1 SEALANTS

- A. Acrylic Latex (Interior minor movement): ASTM C920, single component, non-staining, nonbleeding, non-sagging; white color paintable; manufactured by Pecora AC 20 + silicone.
- B. Butyl Sealant (Interior minor movement): ASTM C920 single component, solvent release, nonskinning, non-sagging, white, paintable; manufactured by Pecora BC 158.
- C. Silicone Sealant (Exterior, Interior major movement and Water Resistant Areas): Single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; color as selected or to match adjacent materials; manufactured by Pecora 895 silicone.
- D. Bituminous Based (Paving): Single component, asphalt compound, elongation capability of 0 to 2 percent of joint width.

## 2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; round, closed or open cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

## 3.2 PREPARATION

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions.
- D. Protect elements surrounding the work of this section from damage or disfiguration.

## 3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

## 3.4 SCHEDULE

- A. Interior; Caulk around all frames, windows, doors, openings, trim, etc., as required to seal or fill gaps, cracks, to make material transitions watertight and/or visually tight and finished.
- B. Exterior; Caulk around all frames, windows, doors, openings, trim, material transitions etc., as required to seal or fill gaps, cracks, to make material transitions watertight and/or visually tight finished.
- C. Paving; Caulk as required to seal or fill gaps, expansion joints, and cracks to make transitions watertight and/or visually tight.

# STANDARD STEEL DOORS AND FRAMES

# PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Non-rated, fire rated and thermally insulated steel doors and frames.
- B. Interior and exterior glazed light frames.

# 1.2 REFERENCES

- A. ANSI A117.1 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. AŇSI/SĎI-100 Standard Steel Doors and Frames.
- C. Door Hardware Institute (DHI) The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- D. NFPA 80 Fire Doors and Windows.
- E. NFPA 252 Fire Tests for Door Assemblies.
- F. UL 10B Fire Tests of Door Assemblies.

# 1.3 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Indicate door and frame elevations, internal reinforcement, closure method, and cutouts for glazing and finish.
- C. Product Data: Indicate door and frame configurations, anchor types and spacings, location of cut-outs for hardware reinforcement.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- 1.4 REGULATORY REQUIREMENTS
  - A. Fire Rated Door and Frame Construction: Conform to ASTM E152 and NFPA 252.
  - B. Installed Door and Panel Assembly: Conform to NFPA 80 for fire rated class as scheduled.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, store, protect, and handle products to site.
  - B. Accept doors and frames on site in manufacturer's packaging. Inspect for damage.
- 1.6 FIELD MEASUREMENTS
  - A. Verify that field measurements are as indicated on shop drawings.

# PART 2 PRODUCTS

# 2.1 DOOR MANUFACTURERS

- A. Ceco Door Products
- B. Steel Craft
- C. Curries Co.
- D. Substitutions: Under provisions of the General Requirements.

# 2.2 DOORS

- A. Exterior Insulated Doors Thermally Broken: SDI-100 Grade III.
- B. Interior Doors (Non-rated and Fire Rated): SDI-100 Grade III.
- 2.3 DOOR CONSTRUCTION
  - A. Face: Steel sheet in accordance with ANSI/SDI-100.
  - B. Core: Polystyrene foam.
  - C. Thermal Insulated Door: Total insulation R value of 7.7, measured in accordance with ASTM C236.

# 2.4 FRAMES

- A. Exterior Frames: 16 gage thick material, base metal thickness.
- B. Interior Frames: 16 gage thick material, base metal thickness.

## 2.5 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style screws.
- B. Primer: Zinc chromate type.
- C. Silencers: Resilient rubber, fitted into drilled hole.

## 2.6 FABRICATION

- A. Astragals for Double Doors: Steel, T shaped, specifically for double doors.
- B. Fabricate doors with hardware reinforcement welded in place.
- C. Attach fire rated label to each door unit.
- D. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
- E. Configure exterior doors with special profile to receive recessed weatherstripping.
- F. Fabricate frames as welded unit.
- G. Mullions for Double Doors: Removable type, of same profiles as jambs.
- H. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
- I. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.
- J. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- K. Prepare frame for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- L. Configure exterior frames with special profile to receive recessed weather stripping.
- M. Fabricate frames to suit masonry wall coursing with 4 or 2 inch head member.

# 2.7 FINISH

- A. Steel Sheet: Galvanized to ASTM A525.
- B. Primer: Baked.
- C. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.

## PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that opening sizes and tolerances are acceptable.

## 3.2 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI-100 and DHI.
- B. Coordinate installation of glass and glazing.
- C. Install door louvers, plumb, and level.
- D. Coordinate installation of doors and frames with installation of frames and hardware specified in Section 08710.
- E. Coordinate with masonry and wallboard wall construction for anchor placement.
- F. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

## 3.3 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

## 3.4 ADJUSTING

A. Adjust door for smooth and balanced door movement.

## SECTION 08 71 13 AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. This Section includes the following types of automatic door operators:
  - 1. Exterior and interior, automatic door operators, low energy, with visible header mounting.
  - 2. Automatic door operators shall be configured for doors as follows:
    - a. Simultaneous pairs.
    - b. Simultaneous pairs, with single operator.
    - c. Single doors.
- B. Related Sections:
  - 1. Division 8 Section "Doors and Frames" for entrances furnished and installed separately in Division 8 Section.
  - 2. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
  - 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
  - 4. Division 26 Sections for electrical connections provided separately including conduit and wiring for power to, and control of, automatic door operators.

## 1.3 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. Underwriters Laboratories (UL):
  - 1. UL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
  - 2. UL 10C Positive Pressure Fire Tests of Door Assemblies
- C. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
  - 1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
  - 2. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- D. American Society for Testing and Materials (ASTM):
  - 1. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 2. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- E. American Association of Automatic Door Manufacturers (AAADM):
  - National Fire Protection Association (NFPA):
    - 1. NFPA 101 Life Safety Code.
    - 2. NFPA 70 National Electric Code.

F.

- G. International Code Council (ICC):
  - 1. IBC: International Building Code
- H. Building Officials and Code Administrators International (BOCA), 1999:
- I. International Standards Organization (ISO):
  - 1. ISO 9001 Standard for Manufacturing Quality Management Systems
  - 2. ISO 14025 Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
  - 3. ISO14040 Environmental Management -- Life Cycle Assessment -- Principles and Framework
  - 4. ISO 14044 Environmental Management -- Life Cycle Assessment -- Requirements and Guidelines
  - 5. ISO 21930 Sustainability in Buildings and Civil Engineering Works -- Core Rules For Environmental Product Declarations Of Construction Products And Services
- J. National Association of Architectural Metal Manufacturers (NAAMM):
  - 1. Metal Finishes Manual for Architectural and Metal Products.
- K. American Architectural Manufacturers Association (AAMA):
  - 1. [AAMA 606.1 Integral Color Anodic Finishes for Architectural Aluminum.]
  - 2. [AAMA 607.1 Clear Anodic Finishes for Architectural Aluminum.]
  - 3. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- L. United Nations Central Product Classification (UNCPC):
  - 1. UNCPC 4212 Product Category Rules for Preparing an Environmental Product Declaration for Power-Operated Pedestrian Doors and Revolving Doors

# 1.4 DEFINITIONS

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- B. Knowing act: Consciously initiating the opening of a power operated door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers, and key switches.

# 1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic door operators capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).
- C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) to set door in motion, and not more than 15 lbf to fully open the door. Forces shall be applied at 1" (25 mm) from the latch edge of the door.

# 1.6 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- C. Color Samples for selection of factory-applied color finishes.
- D. Closeout Submittals: Provide the following with project close-out documents.
  - 1. Owner's Manual.
  - 2. Warranties.
- E. Reports: Based on evaluation performed by a qualified agency, for automatic door operators.
  - 1. Environmental Product Declaration.
  - 2. Evaluation Report for compliance with IBC.

# 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.
- C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.
- D. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
  - 1. ANSI/BHMA A156.10 and A156.19.
  - 2. NFPA 101.
  - 3. UL 325 Listed.
  - 4. UL 10C Listed.
  - 5. IBC 2018.
  - 6. BOCA.
- E. Environmental Product Declaration (EPD): EPD for automatic door operators shall be certified by the manufacturer to comply with the following:
  - 1. Prepared under Product Category Rule (PCR) UNCPC 4212.
  - 2. Conform to ISO standards 14025, 14040, 14044, 21930
  - 3. Life Cycle Assessment Basis: Cradle to Gate, minimum.
- F. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.
- G. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of swinging doors equipped with automatic door operators and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- H. Power Operated Door Standard: ANSI/BHMA A156.19.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- J. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

# 1.8 PROJECT CONDITIONS

- A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

# 1.9 COORDINATION

- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, remote activation devices, and electric door latching hardware.
- C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

# 1.10 WARRANTY

- A. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

# PART 2 - PRODUCTS

# 2.1 AUTOMATIC DOOR OPERATORS

A. Manufacturer: Stanley Access Technologies; M-Force<sup>™</sup> Series automatic door operator.

# 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Headers: 6063-T6.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Sheet and Plate: ASTM B 209.

# 2.3 COMPONENTS

- A. Header Case: Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.
- D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

# 2.4 SWINGING DOOR OPERATORS

- A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.
  - 1. Operation: Power opening and spring closing.
  - 2. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
  - 3. Handing: Non-handed; no tools required to change handing.
  - 4. Capacity: Rated for door panels weighing up to 700 lb (318 kg).
  - 5. Mounting: Visible
  - 6. Features:
    - a. Adjustable opening and closing speeds.
    - b. Adjustable opening and closing force.
    - c. Adjustable back-check.
    - d. Adjustable hold-open time between 0 and 30 seconds.
    - e. Reverse on obstruction.

- f. Time delay for electric lock integration.
- g. Force compensation and closed loop speed control with active braking and acceleration.
- h. Power Close.
- i. Slam Protection.
- j. Power Assist.
- k. Lock Release.
- 1. Stall Sensor Ignore.
- m. Electronic Coordination.
- n. Optional Switch to open/Switch to close operation.
- o. Optional push to activate operation.
- p. Fire alarm interface, configurable to safely open or close doors on signal from fire alarm system.
- C. Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.
- D. Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
- E. Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
- F. Consistent Cycle: The operator shall deliver an even, consistent open manual push force across the entire transition from door fully closed to door fully open. Additionally, the force shall be field adjustable to accommodate a wide range of on-site conditions.
- G. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.
- H. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- I. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps.

# 2.5 ELECTRICAL CONTROLS

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.
  - The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
     Electrical control control control and a 24 VDC control control and a control control
  - 2. Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.
- B. Performance Data: The microprocessor shall collect, and store performance data as follows:
  - 1. Counter: A non-resettable counter to track operating cycles.
  - 2. Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
  - 3. LED Display: Display presenting the current operating state of the controller.
- C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
  - 1. Automatic Reset Upon Power Up.
  - 2. Main Fuse Protection.
  - 3. Electronic Surge Protection.

- 4. Internal Power Supply Protection.
- 5. Resetable sensor supply fuse protection.
- 6. Motor Protection, over-current protection.
- D. Power Close: When enabled, engages the operator to close a door that does not close completely at the end of a cycle.
- E. Force Compensation: Utilizing the closed loop speed control, the operator shall maintain constant opening and closing speeds when subjected to excessive outside forces, such as positive or negative stack pressures.
- F. Slam Protection: The operators speed control system prevents door from slamming at the full open or full closed position.
- G. Power Assist: Operator mode that lowers opening forces when the door is used manually. Power assist is active only while pushing or pulling the door. The door will close when an opening force is no longer applied.
- H. Lock Release: On doors with electric locking, operator shall include a closing function to release tension on a latch mechanism prior to opening the door.
- I. Stall Sensor Ignore: Adjustable setting to disable swing side safety sensors at a specific angle.
- J. Electronic Coordination: On pairs of doors, allows independent timing of opening and closing of each leaf as required for astragal coordination.
- K. Soft Start/Stop: A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
- L. Obstruction Recycle: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle.
- M. Programmable Controller: Microprocessor controller shall be field programmable.
  - 1. The following parameters may be adjusted:
    - a. Operating speeds and forces as required to meet specified ANSI/BHMA standard.
    - b. Adjustable and variable features specified.
  - 2. Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons.
- N. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset, and power will be resumed.
- O. Control Switch: Automatic door operators shall be equipped with a three-position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.
- P. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

# 2.6 ACTIVATION DEVICES

A. Push Plates: Provide 4 <sup>1</sup>/<sub>2</sub> inch (114 mm) square push plates with UL recognized SPDT switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open". Push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls.

# 2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- B. [Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:
  - 1. Color: Dark Bronze.

- 2. AAMA 606.1
- 3. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.]

# PART 3 - EXECUTION

# 3.1 INSPECTION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. General: Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

# 3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

# 3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

## 3.5 CLEANING AND PROTECTION

- A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
- 3.6 Schedule: Located at Doors 101 and 102

# Available options not specified in this document are summarized as follows:

- 1. Mounting options (Visible Specified)
  - a. Concealed; optional with center pivot doors by others.
  - b. Semi-Concealed; optional with butt hung doors by others.
- 2. Header options:
  - a. Bottom Load, with visible or concealed mounting.
- 3. Finish options (Standard Options Specified):
  - a. Color anodizing options; "Champagne" to "Black"
  - b. Multi-coat Fluoropolymer painted finishes.
  - c. Cladding.
- 4. Activation options (Standard Hard Wired Push Plates Specified) including:
  - a. Wireless push plates.
  - b. Wireless transmitters.
  - c. Push plate posts.
  - d. Push to operate.
- 5. Safety options (None Specified) including:
  - a. Overhead safety systems.
  - b. Door mounted safety systems.

# SECTION 08216 (08 14 33)

# STILE AND RAIL WOOD DOORS

# PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Architectural interior stile and rail wood doors.
- 1.2 RELATED SECTIONS
  - A. Section 08100 (08 12 00) Metal Frames.
  - B. Section 08710 (08 71 00) Door Hardware.
  - C. Section 08800 (08 80 00) Glazing.

# 1.3 REFERENCES

- A. NFPA 80 Standard for Fire Doors and Other Opening Protectives.
- B. Window and Door Manufacturers Association:
  - 1. I.S.6-A-13 Industry Standards for Architectural Wood Stile & Rail Doors.
  - 2. TR-8 UV Cured Acrylated Polyester Urethane
- 1.4 SUBMITTALS
  - A. Comply with Section 01330 (01 33 00) Submittal Procedures.
  - B. Product Data: Submit manufacturer's product data.
  - C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating door construction, dimensions, tolerances, materials, [panels,] [hardware,] [glass,] [louvers,] and finish.
  - D. Samples:
    - 1. Doors: Submit manufacturer's construction samples of doors showing materials and finish.
    - 2. Color: Submit manufacturer's door finish samples, showing range of color variation.
  - E. Manufacturer's Certification: Submit manufacturer's certification that doors comply with specified requirements and are suitable for intended application.
  - F. Cleaning Instructions: Submit manufacturer's cleaning instructions for doors.
  - G. Warranty: Submit manufacturer's standard warranty.

# 1.5 QUALITY ASSURANCE

- A. Identifying Label: Each door shall bear identifying label indicating:
  - 1. Door manufacturer.
  - 2. Order number.Door number.
  - **3**. Fire rating, if applicable.
- B. Fire-Rated Doors: Labeled by UL/QAI.
  - 1. Construction Details and Hardware Application: Approved by labeling agency.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
  - 1. Deliver doors to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
  - 1. Store doors in accordance with manufacturer's instructions.
  - 2. Store doors in clean, dry area indoors, protected from damage and direct sunlight.
  - 3. Store doors flat on level surface.

- 4. Do not store doors directly on concrete.
- 5. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
- 6. Store doors between 50 and 90 degrees F (10 and 32 degrees C) and 25 to 55 percent relative humidity.
- 7. Do not subject doors to sudden changes in temperature or relative humidity.

# C. Handling:

- 1. Handle doors in accordance with manufacturer's instructions.
- 2. Protect doors and finish during handling and installation to prevent damage.
- 3. Handle doors with clean hands or clean gloves.
- 4. Lift and carry doors. Do not drag doors across other doors or surfaces.
- 1.7 WARRANTY
  - A. Warrant interior doors for a limited lifetime in interior use against warpage, delamination, and defects in materials and workmanship.
  - B. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

# PART 2 PRODUCTS

# 2.1 MANUFACTURER

- A. VT Industries, Inc., One Eggers Drive, Two Rivers, Wisconsin, 54241. Phone (920) 793-1351. www.vtindustries.com. door\_info@vtindustries.com.
- B. 1. Graham
  - 2. Marshfield
  - 3. Per approved substitution

# 2.2 STILE AND RAIL WOOD DOORS

- A. Architectural Interior Stile and Rail Wood Doors: Eggers Collection.
  - 1. Wood Panels: [E106]
  - 2. Glass Panels: [E204]
  - 3. Wood and Glass Panels: N/A
  - 4. Louver Panels: N/A
  - 5. Wood and Louver Panels: N/A
  - 6. Custom elevations: N/A
- B. Compliance: WDMA I.S.6-A-13, custom grade.
- C. Design:
  - 1. Panel Type: [Flat] [Glass]
- D. Non-Rated Doors and 20-Minute Fire Doors: Eggers Collection.
  - 1. Door Thickness: 1-3/4 inches.
  - 2. Stile Width: 6 inches, unless otherwise noted.
  - 3. Mullion Width: 5 inches, unless otherwise noted.
  - 4. Rails:
    - a. Top Rail Width: 6 inches, unless otherwise noted.
    - b. Lock Rail Width: 5 inches, unless otherwise noted.
    - c. Cross Rail Width: 5 inches, unless otherwise noted.
    - d. Bottom Rail Width: 10 inches, unless otherwise noted.
  - 5. Panels:
    - a. Flat Panel Thickness: 5/8 inch.
    - b. Raised Panel Thickness: 1-1/8 inches.
  - 6. Glass:

- a. Type: Tempered.
- b. Thickness: <sup>1</sup>/<sub>4</sub>"
- 7. Louvers: N/A
- 8. Bar/Muntin:
  - a. Width: 1/2 inch for non-rated doors; <sup>3</sup>/<sub>4</sub> inch for 20-minute doors
  - b. Thickness: 1-3/4 inches.
- 9. Veneers:
  - a. Species: Paint Grade No knots or grain
  - b. Cut: [Plain sliced] [\_
- F. 45-, 60-, and 90-Minute Fire-Rated Doors: Eggers Collection.
  - 1. Door Thickness: 1-3/4 inches.
  - 2. Stile Width: 6 inches.
  - 3. Mullion Width: 5 inches.
  - 4. Rails:
    - a. Top Rail Width: 6 inches.
    - b. Lock Rail Width: 5 inches.
    - c. Cross Rail Width: 5 inches.Bottom Rail Width: 10 inches.
  - 5. Panels:
    - a. Flat Panel Thickness: 5/8 inch.
    - b. Raised Panel Thickness: 1-1/2 inches.
    - c. Minimum Panel Size: 7 inches by 7 inches.
    - \*These thicknesses vary depending on fire rating, single or pair, door size, and labeling agency.
  - 6. Fire Labels: Attach permanent fire label on hinge stile of each fire-rated door or on the top of the door if doors have a continuous hinge.

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- 2.3 DOOR CONSTRUCTION
  - A. Stile Edge: Matching wood edge.
  - B. Inner Stile and Rail:
    - 1. Non-Rated Doors and 20-Minute Fire-Rated Doors: Specified wood veneer pressed over particleboard (Structural Composite Lumber available).
    - 2. 45-, 60-, and 90-Minute Fire-Rated Doors: Specified wood veneer pressed over noncombustible material.
  - C. Panels:
    - 1. Non-Rated Doors and 20-Minute Fire-Rated Doors: Specified wood veneer pressed over composite wood core.
    - 2. 45-,60-, and 90-Minute Fire-Rated Doors: Specified wood veneer pressed over fire-retardant core.
  - D. Stile and Rail Joints: Doweled construction.
  - E. Hinges: Factory drill pilot holes.
  - F. Sticking Used with [Panels] [Louvers] or [Glass]: [Quarter Round] [Ovolo] [Square] [Ogee].

## 2.4 HARDWARE

- A. Factory machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- 2.5 FINISH
  - A. Stile and Rail Doors: Field Finish Paint
  - B. Top and Bottom Rails: Factory sealed only if door is finished

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.

- B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.
- C. Ensure frames are plumb, level, square, and within tolerance.
- 3.2 PREPARATION
  - A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.
- 3.3 INSTALLATION
  - A. Install doors in accordance with manufacturer's instructions.
  - B. Install doors at locations indicated on the Drawings.
  - C. Install doors plumb, level, and square.
  - D. Install door hardware as specified in Section 08710 (08 71 00).

# 3.4 ADJUSTING

- A. Adjust doors to swing freely, without binding in frame.
- B. Adjust hardware to operate properly.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

# 3.5 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage finish.
- 3.6 **PROTECTION**
- A. Protect installed doors from damage during construction.

### ALUMINUM ENTRANCES AND STOREFRONTS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Aluminum doors and frames.
- B. Vision glass and glass.
- C. Door hardware.
- D. Integral air and vapor barrier.
- E. Perimeter sealant.

### 1.02 SYSTEM DESCRIPTION

A. Aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory prefinished, vision glass, related flashings, anchorage, and attachment devices.

#### 1.03 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with codes.
- B. Limit mullion deflection to flexure limit of glass; with full recovery of glazing materials.
- C. System to accommodate, without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.
- D. Limit air leakage through assembly to 0.06 cfm/min/sq. ft. of wall area, measured at a reference differential pressure across assembly of psf as measured in accordance with AAMA 501.
- E. Water Leakage: None, when measured in accordance with AAMA 501 with a test pressure difference of 2.86 lbs/sq. ft.
- F. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental affect to system components.
- H. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

#### 1.04 SUBMITTALS

A. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Protect pre-finished aluminum surfaces. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F during and 48 hours after installation.

### 1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

### 1.08 WARRANTY

- A. Provide three year warranty.
- B. Warranty: Include coverage for complete system for failure to meet specified requirements.

## PART 2 PRODUCTS

#### 2.01 **MANUFACTURERS**

- А. Storefront System
  - Manko Product series 2450 I, Door series 150 H Wide Style. 1. 2.
    - Other acceptable manufacturers offering equivalent Products.
      - Kawneer. a.
      - b. TRACO
      - c. EFCO.
  - 3. Substitutions: Under provisions of the General Requirements.

#### 2.02 **MATERIALS**

- Extruded Aluminum: ANSI/ASTM B221; 6063 alloy, T5 temper. Color: Dark Bronze. A.
- Β. Steel Sections: ANSI/ASTM A36; shaped to suit mullion sections.
- С. Fasteners: Galvanized steel.

#### 2.03 **COMPONENTS**

- Frame: 4 1/2 x 2 inch nominal dimension; glazing stops; drainage holes; internal weep drainage system. A.
- Exterior Doors: 2 inches thick, 5-inch wide top rail, 5-inch wide vertical stiles, 10-inch wide bottom Β. rail; square glazing stops.
- Vestibule Doors: Equal to Manko Series 150 H Wide Stile Door C.
- D. Flashings: Aluminum, finish to match mullion sections where exposed.

#### 2.04 GLASS AND GLAZING MATERIALS

- Glass and Glazing Materials: As specified in Section 08800 of types described below: A.
  - Glass at Exterior Lights: 1-inch insulated type (outer pane of <sup>1</sup>/<sub>4</sub> inch tinted medium bronze at 1. exterior, inner pane of <sup>1</sup>/<sub>4</sub> inch clear). Tempered where required. Low-E coating on third surface.
- 2.05 SEALANT MATERIALS
  - Sealant and Backing Materials: As specified in Section 07900. A.

#### 2.06 HARDWARE

- Weather Stripping, Sill Sweep Strips, Thresholds, Hinges, Tubular Pull Handles, Panic Device, Closer: А. Type to suit application, and finish, all provided by storefront manufacturer / supplier.
- B. Door Hardware at exterior and vestibule doors shall include Von Duprin Rim Panic Devices, Von Duprin Closures, Full length Roton Hinges. All finishes to match Door/Storefront color.
- C. Cost of Storefront hardware shall be included in the **BID PRICE** of the storefront system provider. These cost are NOT to be included in the Hardware Allowance.
- D. Cylinder locks by hardware supplier.

#### 2.07 FABRICATION

- Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet A. enabling installation and dynamic movement of perimeter seal.
- Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof. B.
- Prepare components to receive anchor devices. Fabricate anchors. С.
- D. Arrange fasteners and attachments to conceal from view.
- Prepare components with internal reinforcement for door hardware and door operator hinge hardware. E.
- F. Reinforce framing members for imposed loads.

#### 2.08 **FINISHES**

- Finish coatings to conform to AAMA A.
- Exposed Aluminum Surfaces: Dark Bronze. В.

## PART 3 EXECUTION

#### 3.01 **EXAMINATION**

- Verify site opening conditions. Α.
- B. Verify dimensions, tolerances, and method of attachment with other work.
- C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
- 3.02 **INSTALLATION** 
  - Install wall system in accordance with manufacturer's instructions and AAMA Metal Curtain Wall, Α. Window, Store Front and Entrance - Guide Specifications Manual.

- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided.
- K. Install glass in accordance with Section 08800, to glazing method required to achieve performance criteria.
- L. Install perimeter sealant to method required to achieve performance criteria, backing materials, and installation criteria in accordance with Section 07900.

### 3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

## 3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

## 3.05 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

## 3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work from damage.

### SECTION 08520 ALUMINUM WINDOWS

## PART 1 GENERAL

## 1.01 SECTION INCLUDES

- A. Extruded aluminum fixed windows; glass, shop glazed; panning systems.
- B. Perimeter sealant.

## 1.02 SYSTEM DESCRIPTION

- A. Windows: Tubular aluminum sections, shop fabricated, factory prefinished, vision glass, related flashings, anchorage and attachment devices.
- B. Configuration: Fixed; with manufacturer's standard panning systems.

## 1.03 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as measured in accordance with ASTM E330.
- B. Limit member deflection to 1/200; with full recovery of glazing materials.
- C. System to accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.
- D. Limit air leakage through assembly to 0.10 cfm/min/sq. ft. of wall area, measured at a reference differential pressure across assembly of 6 psf as measured in accordance with ASTM E283.
- E. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 9 lb./sq. ft.
- F. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

## 1.04 SUBMITTALS

- A. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; installation requirements.
- B. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

## 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

## 1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

## PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. MANKO Product
  - 1. 3236I Series fixed windows. Windows shall have sill, head jamb panning and snap trim components. Provide all operating hardware and hinging for maximum vertical opening of operable units.
- B. TRACO
- C. Substitutions: Submit for approval under provisions of the General Requirements.

### 2.02 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper. Color: Dark Bronze.
- B. Fasteners: Galvanized steel. Compatible with window and building materials to not cause corrosion of materials.
- C. Insect Screens: FS RR-W-365, woven aluminum mesh, charcoal finish.
- D. Operable Sash Weatherstripping: Neoprene; permanently resilient, profiled to effect weather seal.
- E. Fasteners: Galvanized steel.
- F. Any steel materials shall be properly isolated from aluminum.

G. All windows shall include manufacturer's sub-framing around perimeter of all openings and "T" mullions at between-window units.

## 2.03 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: Of Types described below:

- 1. Glass in Exterior Lights: 1 inch insulated 1/4 inch exterior tinted Dark Bronze (coordinate with all other exterior glass same manufacturer and tint), 1/4 inch interior clear and obscure where indicated. Low-E coating on third surface.
- 2. Integral Blinds: All glazing at Classroom locations shall be provided with integral louvered blinds. Provide all operating hardware including appropriate length of stick so bottom is 5'-0" a.f.f.
- 3. Spandrel Glazing: Colored Spandrel glass, insulated and compatible with window system. Color to match the tined insulated glass as close as possible. Contractor submit colors for selection.

### 2.04 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07900.

#### 2.05 HARDWARE

A. Sash lock: Lever handle with cam lock, white bronze.

#### 2.06 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal reinforcement in mullions with galvanized steel members to maintain rigidity.
- G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

#### 2.07 FINISHES

- A. Finish coatings to conform to AAMA 608.1.
- B. Exterior Exposed Aluminum Surfaces: Dark Bronze.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install window frames, glass and glazing and hardware in accordance with manufacturer's instructions.B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other
- irregularities.C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.
- D. Install sill and sill end angles (i.e. Standard panning system).
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- G. Install operating hardware.

## 3.02 TOLERANCES

A. Maximum Variation from Level or Plumb: 0.06 inch every 3 ft non-cumulative or 0.5 inch per 100 ft., whichever is less.

#### 3.03 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manuf.

## DOOR HARDWARE

# PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Hardware for wood and hollow steel doors.
  - B. Thresholds.
  - C. Weather stripping, seals, and doorgaskets.
- 1.2 ALLOWANCES
  - A. Cash Allowance: This contractor shall install and furnish all Finish Hardware not specified in other sections, such as millwork. This contractor shall allow the sum of <u>\$20,000.00</u> for the purchase and delivery of hardware only.
  - B. Allowance includes purchase and delivery of hardware only. Installation is included in the Contractor's Bid price, not the allowance. Any differential in the allowance listed and the original invoices from suppliers will be adjusted in the contract price.
- 1.3 REFERENCES
  - A. ANSI A117.1 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- 1.4 OPERATION AND MAINTENANCE DATA
- A. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- 1.5 QUALIFICATIONS
  - A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 3 years' documented experience.
  - B. Hardware Supplier: To be selected by Architect & Owner.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, store, protect, and handle products to site.
  - B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.
  - C. Deliver keys to Owner by security shipment direct from hardware supplier.

## 1.7 WARRANTY

A. Provide five year warranty.

## 1.8 MAINTENANCE MATERIALS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

# PART 2 PRODUCTS

- 2.1 KEYING
  - A. Door Locks: Master keyed. Include construction keying, and key to existing keying system.
  - B. Codes and final keying provided by owner.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.
  - B. Verify that electric power is available to power operated devices and of the correct characteristics.

#### 3.2 **INSTALLATION**

- Install hardware in accordance with manufacturer's instructions. A.
- Use templates provided by hardware item manufacturer. В.
- Mounting heights for hardware from finished floor to center line of hardware item: C.
  - 40" 1. Locksets:
  - 2. Push/Pulls: 45"
  - 3. Dead Locks: 48" 42"

4. Exit Devices:

Thresholds not to exceed  $\frac{1}{2}$ " in height. D.
#### GLAZING

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Glass and glazing for Sections referencing this Section for products and installation.

#### 1.02 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials of this Section shall provide continuity of building enclosure vapor and air barrier:
  - To utilize the inner pane of multiple pane sealed units for the continuity of the air and vapor seal.
     Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with UBC 91 code.
- C. Limit glass deflection to 1/200 flexure limit of glass with full recovery of glazing materials, whichever is less.

#### 1.03 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

#### 1.04 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

#### 1.05 COORDINATION

A. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

#### 1.06 WARRANTY

- A. Provide five year manufacturer's warranty.
- B. Warranty: Include coverage for sealed glass units from seal failure, interpane dusting, or misting, reflective coating on mirrors, delamination of laminated glass and replacement of same.

#### PART 2 PRODUCTS

#### 2.01 FLAT GLASS MATERIALS

- A. Float Glass (Type FG): Clear, 1/4 inch thick minimum.
- B. Safety Glass (Type SG): Clear; fully tempered with horizontal tempering 1/4 inch thick minimum at all locations where glass is less than 18 inches above finished floor.
- C. Tinted Glass (Type TG): Float type, heat strengthened, light reducing, color (to be selected); 1/4 inch thick minimum.
- D. Wire Glass (Type WG): Clear, polished both sides diagonal mesh of woven stainless steel wire of 1/2 inch grid size; 1/4 inch thick.
- E. Mirror Glass (Type MG): Clear tempered safety type with copper and silver coating, organic overcoating, rounded, sanded, edges, 1/4 inch thick minimum, sizes as indicated.
- F. Shatter Resistant Glass: (Type SRG): Clear laminated, 5/16 inch composite 2 1/8-inch thick panels laminated with .060 inner layer film, sizes as indicated.

#### 2.02 SEALED INSULATING GLASS MATERIALS

- A. Insulated Glass Units (Type IG): ASTM E774 and E773; double pane with edge seal; outer pane of 1/4 inch glass tinted at exterior, inner pane of 1/4 inch glass. Low-E coating on third surface. Provide integral blinds and all operating hardware where indicated on drawings.
- B. Performance Requirements: U-Value: Winter Night – 0.29 Summer Day – 0.27 R-Value – 3.43 Shading Coefficient (sc) – 0.37 Solar Heat Gain Coefficient (SHGC) – 0.32 Relative Heat Gain (RHG) – 77 Light to Solar Gain (LSG) – 1.23 Sound Transmission Class (STC) - 35

#### 2.03 SPECIAL GLASS AND GLAZING SYSTEMS

- A. Fire rated glass to be part of a 90-minute-rated door/window assembly.
  - 1. Product FireLite® Plus, Premium Grade.
- B. Glazing with Integral Blinds Located at ICU style telescoping doors
   1. Units shall be made of fully tempered glass at both panes with interior blinds sealed between the panes.

- 2. Blinds shall be operable by thumb-turn mechanism.
- 3. Glazing unit manufacturer to provide special glazing stops as required to install in telescoping door panels.
- 4. Product shall be equal to Unicel Vision Contol Mini glazing system.

#### C. Display Case Sliding Doors

- 1. Tempered Safety Glass, <sup>1</sup>/<sub>4</sub>" thickness. Rounded and sanded edges.
- 2. Clear with non-glare finish.
- 3. Reference section 10850 for hardware requirements.
- D. Etched/Frosted Glass.
  - 1. Partially Etched/Partially Clear Glass with integrated logo and text. Located at pair doors 014.
  - 2. Etching shall be factory finished or screen printed.

3. Logo and pattern to be determined. For bidding purposes assume that the door glazing shall be 40% etched and the following narrative:

- a. Door Leaf 1 "Salina Regional Health Foundation", and SRHC Logo
- b. Door Leaf 2 "Simulation Suite" and Logo

#### 2.04 GLAZING COMPOUNDS

- A. Exterior windows not shop installed shall be glazed with vinyl or neoprene gaskets, extruded elastic polybutene tape sealant, a combination of polysulphide base compound and elastic glazing compound, or a combination of extruded polysulphide tape, polysulphide base compound elastic glazing compound.
- B. Doors and interior stopped -in glass shall be glazed using putty or elastic glazing compound and stop beads.
  C. Exterior glazing of steel sash shall be DAP Metal Glaze. Interior glazing of steel sash shall be DAP Steel Sash Putty.

#### 2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene or Silicone, 80 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene or Silicone, 50 60 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 15 Shore A durometer hardness; coiled on release paper.
- D. Glazing Clips: Manufacturer's standard type.
- E. Mirror Attachment Accessories: Mirror adhesive, chemically compatible with mirror coating and wall substrate.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

#### 3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install glazing in accordance with Flat Jobbers Association Glazing Manual.

#### 3.03 INSTALLATION - MIRRORS

- A. Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.
- B. Place plumb and level.

#### 3.04 CLEANING

A. Remove glazing materials from finish surfaces. Remove labels after work is complete. Clean glass and mirrors.

#### 3.05 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

#### GYPSUM BOARD SYSTEMS

# PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Metal stud wall framing.
  - B. Acoustical insulation.
  - C. Gypsum board.
  - D. Water resistant tile backer board.
  - E. Taped and sanded joint treatment, Level 5 finish.

#### 1.02 REFERENCES

- A. ASTM C36 Gypsum Wallboard.
- B. ASTM C475 Joint Treatment Materials for Gypsum Wallboard Construction.
- C. ASTM C630 Water Resistant Gypsum Backing Board.

#### PART 2 PRODUCTS

- 2.01 MANUFACTURERS GYPSUM BOARD SYSTEM
  - A. National Gypsum Company.
  - B. Other acceptable manufacturers offering equivalent products.
  - C. Substitutions: Under provisions of the General Requirements.

#### 2.02 FRAMING MATERIALS

A. Reference Section 9111 Metal Stud.

#### 2.03 GYPSUM BOARD MATERIALS

- A. Fire Rated Gypsum Board: ASTM C36; Gypsum, Type "X" fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. Product Goldbond XP Fireshield. Provide at all drywall located on exterior walls.
- B. Fire Rated Gypsum Board: Type "X" fire resistive type, UL rated, 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. Product equal to National Gypsum Gold Bond Fireshield Gypsum Board.
- C. Gypsum Wall Board Tile Backer: ASTM C36; Gypsum, Type "X" fire resistive type, UL rated; 5/8 inch thick. Acrylic coated mold and moisture resistant panel. Panels to be cut to maximum permissible length; ends square cut, tapered edges. Product Goldbond eXP. Located at all interior walls scheduled to receive tile.

#### 2.04 ACCESSORIES

- A. Acoustical Insulation: glass fiber, friction fit type, unfaced, 3 1/2 or 5 1/2 inch thick.
- B. Corner Beads: Metal. Provide 1" Radius corners at EBD office and EBD classrooms.
- C. Edge Trim: GA 201 and GA 216; Type L bead.
- D. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water.
- E. Fasteners: ASTM C1002, Type S12, W, and GA-216.
- F. Resilient channel: USG, RC-1 or equal.
- G. Molded Reveal Joints: Fry Reglet,  $\frac{1}{4}$ " x  $\frac{1}{4}$ "; DRM 25 25.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

#### 3.02 METAL STUD INSTALLATION

- A. Install studs in accordance with ASTM C754 and manufacturer's instructions.
- B. Metal Stud Spacing: 16 inches on center, unless noted otherwise.
- C. Refer to Drawings for indication of partitions, extend stud framing through the ceiling to the structure above, unless noted otherwise. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- D. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

E. Blocking: Nail wood blocking to studs or Bolt or screw steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

#### 3.03 WALL FURRING INSTALLATION

- A. Erect wall furring for direct attachment to concrete block walls.
- B. Erect furring channels vertically; space maximum 16 inches on center, not more than 4 inches from floor and ceiling lines, abutting walls.
- C. Install thermal insulation between furring channels directly attached to concrete masonry walls in accordance with manufacturer's instructions.
- D. Erect free-standing metal stud framing tight to concrete masonry walls, attached by adjustable furring brackets in accordance with manufacturer's instructions.

#### 3.04 FURRING FOR FIRE RATINGS

- A. Install furring as required for fire resistance ratings indicated.
- B. Columns in rated walls shall be wrapped independently from wall system.

#### 3.05 CEILING FRAMING INSTALLATION

- A. Coordinate location of hangers with other work.
- B. Install ceiling framing independent of walls, columns, and above ceiling work.
- C. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels,
- with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
- D. Laterally brace entire suspension system.

# 3.06 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Install resilient channels at maximum 12 inches on center. Locate joints over framing members.
- B. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

#### 3.07 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with manufacturer's instructions.
- B. Erect single layer standard gypsum board vertical, with ends and edges occurring over firm bearing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Use screws when fastening gypsum board to metal furring or framing.
- E. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
- F. Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.
- G. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum board with sealant.
- H. Place control joints consistent with lines of building spaces and as directed. Install at approximately 30' intervals in walls. Coordinate locations with Architect.
- I. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials as indicated.
- J. Caulk at sound walls.

#### 3.08 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready for finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32.
- C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
- D. Tape joints and corners of cementitious backing board using cement based joint compound as recommended by the manufacturer.
- E. Level 5 finish. Level 4 finish is acceptable at storage rooms only.

#### 3.09 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

#### SECTION 09260-A Gypsum Board Systems Preinstallation Checklist

# Wall Framing Checklist for Construction Projects Prior to Final Sheetrock Application

Date: \_\_\_\_\_

Name of Inspector:\_\_\_\_\_

Location of walls inspected:

	ITEMS TO INSDECT	
	ITEMS TO INSPECT	
1.	Clean all cavities in side wall frame with a vacuum. Do not leave any trash, dirt, dust, or debris of any kind in side wall.	
2.	Verify all framing is securely anchored and fastened. Verify no screws are missing. Any bent or twisted studs or track will be repaired or replaced. Verify anchoring is by specification or industry standard. Additional anchoring at door locations.	
3.	Ensure all cross bracing and necessary seismic connections are in place when applicable.	
4.	Any rusted framing or door frames will be removed and replaced with new material.	
5.	Verify all door frame openings are properly fastened and frame grouted. Header installed, tabs anchored to the floor, heavy gage Jack studs and King studs used on each side of frame (Refer to spec for gage size).	
6.	Verify all electrical boxes and conduits are anchored to stud securely in such a manner that pushing on any corners of the box will not allow the box to move inwards.	
7.	All plumbing piping anchored securely. Verify all piping is connected, tested for leaks and insulated per specification.	
8.	Verify all wall backing is installed for items such as hand rails and toilet accessories (refer to plans and specification for items and location). a. Verify any wood backing used is labeled fire rated stock.	
9.	Verify all batt insulation is secured in place in such a manner to keep it from siding down over time once the wall is built. Supplement friction fit to ensure batts remaining as placed.	
10.	Verify all sound attenuation material is installed per specification and manufactures instructions.	
11.	Verify all trades have coordinated proper installation of items at the proper locations per project plans.	
12.	Verify all medical gas piping is installed, supported an anchored per specification and code requirement.	
13.	Verify mechanical ducting systems are installed, supported, and anchored per specification and all joints fully sealed and insulation is completed.	
14.	Verify all through floor or deck penetrations that will be within the wall are properly caulked and sealed with specified materials.	

# FLOOR AND WALL TILE

# PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Ceramic tile floor finish using the thinset application method or as recommended by Manufacturer.
  - B. Ceramic tile wall finish using the thinset application method.
- 1.02 SUBMITTALS
  - A. Submit under provisions of the General Requirements.
  - B. Product Data: Provide instructions for using adhesives and grouts.
  - C. Samples: Submit two samples illustrating pattern, color variations, and grout color.
- 1.03 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, store, protect, and handle products to site.
  - B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
- 1.04 ENVIRONMENTAL REQUIREMENTS
  - A. Do not install adhesives in an unventilated environment.
  - B. Maintain 50 degrees F during installation of mortar materials.
- 1.05 EXTRA MATERIALS
  - A. Provide 10 square feet (full/uncut) of each type of tile to Owner.

# PART 2 PRODUCTS

- 2.01 TILE MANUFACTURER
  - A. Crossville Products: Reference Schedule.
  - B. Substitutions: Under provisions of the General Requirements, Materials listed are for pricing purposes, final colors to be selected by Architect. Alternate tile manufacturers and styles may be selected at architect's discretion, based on similar cost and availability.
- 2.02 CERAMIC TILE MATERIALS
  - A. Porcelain Floor, Wall & Base Tile: ANSI A137.1, reference schedule.
- 2.04 ADHESIVE MATERIALS
  - A. Adhesives: Thinset bond type as recommended and/or manufactured by the tile manufacturer.
- 2.05 MORTAR MATERIALS
  - A. Mortar Materials: Portland cement, sand, latex additive, and water as recommended and/or manufactured by the tile manufacturer, color to be selected.
- 2.06 GROUT MIX
  - A. Mix and proportion pre-mix grout materials in accordance with manufacturer's instructions. Color to be selected.
  - B. Manufacturer: TEC, AccuColor Power Grout, full range of colors.
- PART 3 EXECUTION
- 3.01 EXAMINATION
  - A. Verify that surfaces are ready to receive work.

# 3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Apply sealer conditioner to substrate surfaces in accordance with adhesive manufacturer's instructions.

# 3.03 INSTALLATION - THINSET METHOD

- A. Install adhesive tile, thresholds, and grout in accordance with manufacturer's instructions and/or the TCA Handbook.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Place edge strips at exposed tile edges.
- D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base, and wall joints.
- E. Place tile joints uniform in width, Floor joints shall be as narrow (approximately 1/8") as allowed by manufacturer, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout. Provide mock-up area (approximately 4'x4') for owner review of joint spacing and grout depth prior to installation of finish floor tile.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep expansion, control joints free of adhesive or grout. Apply sealant to joints.
- H. Allow tile to set for a minimum of 48 hours prior to grouting.
- I. Grout tile joints.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- K. Install shower pans per manufacturer's instructions.

# 3.04 CLEANING

- A. Clean tile and grout surfaces.
- B. Grout Joints shall be sealed (2 coats) using sealer product as recommended by the grout manufacturer.

# 3.05 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 4 days after installation.
- B. Install protective material as required to protect finished installation thru completion of construction.
- 3.06 SCHEDULE OF TILES
  - A. Styles and colors identified are for bidding purposes, final styles and colors may vary depending on availability and alternate manufacturers or installers.
    - Wall Tile CT1 (field) Crossville, Retro-Active, 12" x 6"; non-polished; 60% field ratio; Color – To be Selected.
      - a. Located at Restrooms 122, 129, 132, 134
    - 2. Wall Tile CT2 (field) Crossville, Retro-Active, 12" x 6"; non-polished; Color To be Selected.

a. Located at Restrooms 122, 129, 132, 134

- 3. Floor Tile CT3 (Field) Dal-Tile Slate Imagica., 12" x 24", non-polished; Color to be Selected. Located at Restroom Floors.
- 4. Grout colors to be selected by architect.

#### SUSPENDED ACOUSTICAL CEILINGS

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system and perimeter trim, to match existing.
- B. Acoustical tile, to match existing.

#### 1.02 SYSTEM DESCRIPTION

B. Suspension system to rigidly secure acoustical ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

#### 1.03 SUBMITTALS

- A. Product Data: Provide data on metal grid system components, and acoustical units.
- B. Samples: Submit two samples illustrating material and finish of acoustical units.
- C. Samples: Submit two samples each, of suspension system main runner, cross runner, and edge trim.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

#### 1.04 QUALIFICATIONS

- A. Grid and Tile Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Conform to applicable code for fire rated assembly and combustibility requirements for materials.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

# PART 2 PRODUCTS

# 2.01 MANUFACTURERS - SUSPENSION SYSTEM

- A. Armstrong Product: Prelude XL Heavy Duty Galvanized Exposed Tee 15/16"; Located at Type 1 Ceilings
- B. Armstrong Product Silhouette XL 9/16 Bolt Slot w/ ¼" reveal. Galvanized Exposed Tee 9/16"; Staggered Joint Pattern, provide all clips and trims for corner and intersecting grids; Located at Type 2 ceilings.
- C. Substitutions: Under provisions of the General Requirements.

#### 2.02 SUSPENSION SYSTEM MATERIALS

- A. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
- B. Exposed Grid Surface Width: 15/16 inch.
- C. Grid Finish: White.
- D. Accessories: Stabilizer bars, clips, splices, edge moldings, hold down clips, and light protection hoods required for rated suspended grid systems.
- E. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

#### 2.03 ACOUSTICAL UNIT MATERIALS A. Acoustical Panels: ASTM E1264, con

- Acoustical Panels: ASTM E1264, conforming to the following:
  - 1. Type I Armstrong Ultima Health Zone, High NRC, 2'x2'x7/8", Square edge. Item No. 1445, Non-Rated, Class A, Color White.
  - 2. Type 2 Armstrong Ultima Health Zone, 2'x4'x3/4, Square edge Item No. 1938, Non-Rated, Class A, Color White; For installation in slot-grid.

#### 2.04 ACCESSORIES

- A. Touch-up Paint: Type and color to match acoustical and grid units.
- B. Extra Material: Provide one unopened carton of each ceiling type to the owner.

# PART 3 EXCUTION

# 3.01 EXAMINATION

A. Verify that layout of hangers will not interfere with other work.

# 3.02 INSTALLATION - LAY-IN GRID SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and manufacturer's instructions and as supplemented in this section.
- C. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- D. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- E. Locate system on room axis according to reflected plan.
- F. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- G. Supply hangers or inserts for installation to Section with instructions for their correct placement.
- H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
- K. Do not eccentrically load system, or produce rotation of runners.
- L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.
- M. Form expansion joints as required or detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- N. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with UL assembly requirements at fire rated ceiling assemblies at rated ceiling assemblies.
- O. Install support hangers at (4) four corners of recessed light fixtures.

# 3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.
- D. Install units after above ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.
- F. Cut tile to fit irregular grid and perimeter edge trim. Field rabbet tile edge. Double cut and field paint exposed edges of tegular units.
- G. Where bullnose concrete block corners or round obstructions occur, provide preformed closers to match edge molding.
- H. Install hold-down clips to retain panels tight to grid system as required to meet ratings.

# 3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

# **RESILIENT FLOORING**

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

Resilient base. A.

#### 1.02 **SUBMITTALS**

- Product Data: Provide data on specified products, describing physical characteristics; sizes, patterns Α. and colors available.
- B. Samples: Submit one sample, illustrating color and pattern for each floor material.
- Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring C. special attention, and seaming recommendations.

#### 1.03 **REGULATORY REQUIREMENTS**

Conform to code for flame/smoke rating requirements in accordance with ASTM E84. A.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- Deliver, store, protect, and handle products to site under provisions of the General Requirements. A.
- Protect roll materials from damage. B.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

- Store materials for three days prior to installation in area of installation to achieve temperature A. stability.
- Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 B. hours after installation of materials.
- MAINTENANCE DATA 1.06
  - Maintenance Data: Include maintenance procedures, recommended maintenance materials, and A. suggested schedule for cleaning, stripping, and re-waxing.
- 1.07 EXTRA MATERIALS
  - Provide 10 lineal feet of base material specified. A.
  - Provide 60 sf of each type & color of flooring. B.

# PART 2 PRODUCTS

- MATERIALS Luxury Vinyl Tile and Plank Flooring 2.01
  - Vinyl Plank Flooring: ASTM F1700, Gerfloor, Creation Click system, Class 3, Type B, A. color to be selected from manufacturer's full line.
    - Size: 6" wide x 36" maximum permissible length. Install staggered joints, random length.
       Thickness: .5 mm, Wear layer .022mil
    - 2.
    - Adhesives: Install using manufacturer recommended adhesives for 12 year warranty. 3. a. Adhesive shall be type recommended and approved by the manufacturer for installation over subfloor with moisture content 98% or higher.

#### 2.02 **MATERIALS - BASE**

- Base: FS SS-W-40. Rubber; coved; premolded external corners only where mitering and bending of Α. base is not possible or where returns are less than 4" long.
  - 1. Height: 4 inch
  - 2. Thickness: 1/8 inch thick
  - 3. Length: Roll. Strips are not acceptable. Maximum of 1 joint/seam on any wall.
  - 4. Manufacturers:
    - a) Roppe.
    - b) Johnsonite
    - c) Or as approved equal.
  - 5. Color to be selected from manufacturer full range. Matte finish
- Base: Rubber: Non-cove at base of columns. Β.

# 2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Edge Strips: Schluter edge strips for low/zero profile flooring transitions. Raised rubber/vinyl transition strips are not acceptable.
- D. Stair Nosings. Rubber, 1 <sup>1</sup>/<sub>2</sub> inch, low profile nosing for installation at carpeted stairs and risers. Product equal to Rope Part #5

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify concrete floors are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- B Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

# 3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. The contractor and installer shall review existing floor condition. Existing carpet backing, adhesive residue, and any and all materials shall be thoroughly removed, cleaned, and prepped prior to any floor installation.
- C. The Contractor and installer shall include all cost for labor and material to prep, level, skim, grind, and any other measures to ensure level and stable subfloor prior to installing flooring to ensure that final floor installation is free of bumps, waves, and physical and/or aesthetic flaws in the installation.
- B. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer as recommended by manufacturer.

# 3.03 INSTALLATION - STAIR COVERINGS

- A. Install stair treads and stair risers in one piece for full width and depth of tread.
- B. Install stair skirting configured tight to stair and stringer profile.
- C. Adhere over entire surface. Fit accurately and securely.

# 3.04 INSTALLATION - BASE

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units or "V" cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

# 3.05 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Install tile to basket weave pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- G. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- H. Install resilient edge strips at unprotected or exposed edges, and where flooring terminates.
- I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

# 3.06 CLEANING

- A. Clean all work as described in the General Requirements.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean, seal, and buff floors in accordance with manufacturer's instructions.

# 3.07 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Prohibit traffic on floor finish for 48 hours after installation.

# SECTION 09688 CARPET TILE- GLUE DOWN

# PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Carpet placed with glue down method.
  - B. Accessories.

# 1.02 ALLOWANCES

- A. Cash Allowance: This contractor shall install and furnish all carpet.
  - Walk-off Carpet Type: This contractor shall allow the sum of <u>\$45.00 per square yard</u> for purchase and delivery of carpet only.
  - All other carpet areas: This contractor shall allow the sum of <u>\$32.00 per square yard</u> for purchase and delivery of carpet only.
- B. Allowance includes purchase and delivery of carpet only. Installation, glue, and accessories are included in the Contractors Bid price, **not** the allowance. Any differential in the allowance amount listed above and original invoices from the supplier will be adjusted in the contract price.
- 1.03 SUBMITTALS
  - A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
  - B. Samples: Submit one sample illustrating color and pattern for each carpet material specified.
  - C. Submit one sample of edge strip, material for each color specified.
  - D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

# 1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing specified carpet with minimum three years documented experience.
- B. Installer: Company specializing in installing carpet with minimum three years documented experience and approved by manufacturer.

# 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature 1 day prior to, during and 24 hours after installation.

# 1.06 MAINTENANCE DATA

A. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

# 1.07 EXTRA MATERIAL

A. Provide 100 sq. ft. of carpeting of each type, color, and pattern specified.

# PART 2 PRODUCTS

# 2.01 ACCEPTABLE MANUFACTURERS - CARPETING

- A. J & J Industries or Invision
- B. Patcraft
- C. Lees
- D. Shaw Contract Group
- E. Substitutions: Under provisions of the General Requirements.
- 2.02 CARPET PRODUCTS
  - A. <u>As selected by Architect. A variety of carpet types and styles may be used (i.e. actionbac, integral pad, tile, variety of colors, variety of manufacturers)</u>. For bidding purposes; it is recommended that Installer figure labor involving greatest amount of work.

B. It is anticipated that up to 4 carpet tile styles may be selected.

# 2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Adhesive: Compatible with carpet material and as Recommended by carpet manufacturer. Adhesive shall be type approved by the manufacturer for slab moisture content of 95% or higher.
- C. Edge Strips: Schluter, Metal transition strips for low/zero profile between materials. Raised rubber transition strips are not acceptable

# PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 ft., and are ready to receive work.
- B. Verify concrete floors are dry to maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

#### 3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

# 3.03 INSTALLATION

- A. Apply carpet and adhesive in accordance with manufacturer's instructions.
- B. Verify carpet match before cutting to ensure minimal variation between dye lots.
- C. Double cut carpet, to allow intended seam and pattern match. Make cuts straight, true, and unfrayed. Edge seam carpet at traffic areas.
- D. Locate seams in area of least traffic.
- E. Join seams by hot adhesive tape method. Form seams straight, not overlapped or peaked, and free of gaps.
- F. Lay carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance. Provide monolithic color, pattern, and texture match within any one area.
- G. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- H. Cut and fit carpet around interruptions.
- I. Bind cut edges where not concealed by edge strips.
- J. Fit carpet tight to intersection with vertical surfaces without gaps.
- K. Where wall bases are scheduled, cut carpet tight to walls. Fit carpet tight to vertical interruptions, leaving no gaps.

# 3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

#### PAINTING

# PART 1 GENERAL

#### 1.1 SECTION INCLUDES

A. Surface preparation and field application of paints and coatings.

#### 1.2 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum years documented experience and approved by manufacturer.

# 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

# 1.5 EXTRA MATERIALS

A. Provide one gallon of each color to owner.

# PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

A. Manufacturer - Paint, Transparent Finishes, Stain, Primer Sealers, and Block Filler by SHERWIN- WILLIAMS or as approved equal.

#### 2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

#### 2.3 FINISHES

A. Refer to schedule at end of section for surface finish schedule.

# 3.1 EXAMINATION

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop applied primer for compatibility with subsequent cover materials.

# 3.2 PREPARATION

- A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
- C. Seal with shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Copper Surfaces Scheduled for a Paint Finish: Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.
- J. Copper Surfaces Scheduled for a Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.
- K. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of trisodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- N. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- O. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand, power tool wire brushing or sandblasting, and clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- P. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- Q. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- R. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.

- S. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.
- T. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.
- U. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease, and dirt.
- V. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.
- 3.3 APPLICATION
  - A. Apply products in accordance with manufacturer's instructions.
  - B. Do not apply finishes to surfaces that are not dry.
  - C. Apply each coat to uniform finish.
  - D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
  - E. Sand wood and metal lightly between coats to achieve required finish.
  - F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
  - G. Allow applied coat to dry before next coat is applied.
  - H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
  - I. Prime concealed surfaces of interior and exterior woodwork with primer paint.
  - J. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

#### 3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars, and supports except where items are prefinished.
- C. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- D. Paint exposed conduit and electrical equipment occurring in finished areas.
- E. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### 3.5 CLEANING

A. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

#### 3.6 SCHEDULE

The following are for exterior and interior surfaces, and are all products of Sherwin-Williams.

#### EXTERIOR SURFACES

1. WOOD

Α

- A. Flat Finish/Latex Base
  - 1st Coat: Exterior Wood Primer, B42W8041
  - 2nd Coat: A-100 Exterior Latex Satin A82 Series
  - 3rd Coat: A-100 Exterior Latex Satin A82 Series

#### 2. FERROUS METAL

- Painted (Gloss Finish/Alkyd Base)
  - 1st Coat: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310
  - 2nd Coat: Waterbased Acrolon 100 Polyurethane Gloss, B65-700 Series
  - 3rd Coat: Waterbased Acrolon 100 Polyurethane Gloss, B65-700 Series

- 3. GALVANIZED and ALUMINUM METALS
  - A. Painted (Semi-Gloss Finish/Latex Base)
    - 1st Coat: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310
    - 2nd Coat: Pro Industrical Zero VOC Acrylic Semi-Gloss, B66 Series.
    - 3rd Coat: Pro Industrical Zero VOC Acrylic Semi-Gloss, B66 Series.
- 4. CONCRETE MASONRY UNITS
  - A. Painted (Flat Finish/Latex Base) 1st Coat: Loxon Block Surfacer, A24W200 2nd Coat: A-100 Exterior Latex Satin, A82 Series
    - 3rd Coat: A-100 Exterior Latex Satin, A82 Series
- 5. CONCRETE/BRICK
  - A. Painted (Flat Finish/Latex Base)
    - 1st Coat: Loxon Concrete and Masonry Primer, A24W8300
    - 2nd Coat: DuraCraft Exterior Latex Satin, C7 Series
    - 3rd Coat: DuraCraft Exterior Latex Satin, C7 Series
- 6. PLASTER/STUCCO/EIFS
  - A. Painted (Flat Finish/Latex Base)
    - 1st Coat: Loxon Concrete and Masonry Primer, A24W8300
    - 2nd Coat: A-100 Exterior Latex Satin, A82 Series
    - 3rd Coat: A-100 Exterior Latex Satin, A82 Series
- 7. TRAFFIC AND PARKING LINE MARKING
  - A. Painted (ProMar Traffic Marking Paint) 1st Coat: B29W1-WHITE

#### INTERIOR SURFACES

- 1. WOOD AND PLYWOOD
  - A. Painted (Semi-gloss Finish/Alkyd Base)
    - 1st Coat: ProMar 200 Zero VOC Primer, B28W2600
    - 2nd Coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 Series
    - 3rd Coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 Series
  - B. Stained and Varnished (Clear Finish) Opened Grained Wood
    - 1st Coat: Wood Classics, A49W800 Series
    - 2nd Coat: Wood Classics WB Polyurethane A68
    - 3rd Coat: Wood Classics WB Polyurethane A68

#### 2. CONCRETE BLOCK (CMU)

- A. Painted (Semi-Gloss Finish/Epoxy Base)
  - 1st Coat: PrepRite® Block Filler, B25W25
- 2nd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC

3rd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC

- 3. GYPSUM WALLBOARD
  - A. Painted (Eg-Shel Finish/Latex Base)
    - 1st Coat: ProMar 200, Zero VOC Interior Latex Primer, B28W2600
    - 2nd Coat: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2650
    - 3rd Coat: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2650
  - B. Hallways to receive 2 coats Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss K46W051 VOC
- 4. FERROUS METAL
  - A. Painted (Gloss Finish/Alkyd Base)
    - 1st Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310
    - 2nd Coat: Pro Industrial Zero VOC Waterbased Epoxy Gloss, B73-300 Series
    - 3rd Coat: Pro Industrial Zero VOC Waterbased Epoxy Gloss, B73-300 Series
    - NOTE: Doors and Frames to be sprayed. No brush/roller marks will be accepted.

#### 5. GALVANIZED METAL

A. Painted (Semi-Gloss Finish/Alkyd Base)

1st Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series

2nd Coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series 3rd Coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series NOTE: Doors and Frames to be sprayed. No brush/roller marks will be accepted.

- 6. CONCRETE FLOORS (SEALED)
  - A. Painted (Clear Acrylic Floor Finish)
    - 1st Coat:WR Meadows Tiah Acrylic Concrete Sealer, Solvent Based2nd Coat:WR Meadows Tiah Acrylic Concrete Sealer, Solvent Based

# 7. PRECAST CONCRETE WALL PANELS

- A. Painted and Textured
  - 1st Coat: SW Loxon Concrete and masonry primer-sealer A24W3300
     2nd Coat: SW Ultracrete A44W800 (Apply to Mfg recommended coverage).
     3<sup>rd</sup>&4<sup>th</sup> Coat:2 coats Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss K46W051 VOC

# CONCRETE AND MASONRY COLOR TREATMENT

# PART 1 GENERAL

# 1.1 SECTION INCLUDES

A. Water Based Stain

# 1.2 RELATED SECTIONS

- A. Section 03 30 00 Cast-in-Place Concrete.
- B. Section 03 11 16.13 Concrete Form Liners.
- C. Section 03 35 23 Exposed Aggregate Concrete Finishing.
- D. Section 03 41 16 Precast Concrete Slabs.
- E. Section 03 45 13 Faced Architectural Precast Concrete.
- F. Section 03 47 13 Tilt-Up Concrete.
- G. Section 03 49 00 Glass-Fiber-Reinforced Concrete.
- H. Section 03 50 00 Cast Decks and Underlayment.
- I. Section 04 20 00 Unit Masonry.
- J. Section 04 40 00 Stone Assemblies.
- K. Section 09 22 00 Stucco.
- L. Section 09 24 13 Adobe Finish.

# 1.3 REFERENCES

- A. ASTM C 744 Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
- B. SCAQMDR 1168 South Coast Air Quality Management District's (SCAQMD) Volatile Organic Compounds (VOC) Rule 1168.
- 1.4 SUBMITTALS
  - A. Submit under provisions of Section 01 30 00 Administrative Requirements.
  - B. Product Data: Manufacturer's data sheets on each product to be used, including:
    - 1. Product characteristics.
    - 2. Preparation instructions and recommendations.
    - 3. Storage and handling requirements and recommendations.
    - 4. Installation methods.
  - C. Preliminary Samples: To be provided as required for the specific project.
  - D. Verification Samples: To be provided on the specific materials to be treated when they are available in plant or on site.
  - E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

# 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An international manufacturer with a minimum of 20 years of experience in the production of the stains and coatings of type specified.
- B. Installer Qualifications: Installer licensed by Nawkaw to apply the stain products specified and with a minimum of three years documented experience in applying stains and coatings similar in type and scale to this Project.
- C. Environmental Regulations: The masonry stain material to be applied is in compliance with federal, provincial and local environmental Volatile Organic Compounds (VOC) regulations.
- D. Mock-Up: Apply a minimum one square foot sample of each type of color application required.
  - 1. Finish areas designated by Architect.
  - 2. Prepare each sample in an area where it will be exposed to the same conditions as will be present on the building during curing.
  - 3. Samples should be viewed from a minimum distance of 20 feet.
  - 4. Do not proceed with remaining work until color and finish is approved by Architect.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and handle products in accordance with requirements of manufacturer.
- C. Store materials inside if possible, away from open flame. Store in a secure area to avoid tampering and contamination. Water-based materials must be kept from freezing.

# 1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

# 1.8 WARRANTY

- A. At project closeout, provide to Owner or Owner's Representative an executed copy of the manufacturer's standard limited warranty against manufacturing and workmanship defects, outlining its terms, conditions, and exclusions from coverage.
  - 1. Duration: 25 years.

# PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Acceptable Manufacturer: Nawkaw Corporation, which is located at: 370 Commerce Blvd; Athens, GA 30606; Toll Free Tel: 866-462-9529; Tel: 706-355-3217; Fax: 706-355-9199; Email: info@nawkaw.com; Web: <u>http://www.nawkaw.com/</u>
  - B. Substitutions: Not permitted.
  - C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 Product Requirements.

# 2.2 WATER-BASED STAIN

- A. NawTone (Formerly NECT-90):
  - 1. General: NawTone: high-quality, water-based, highly permeable acrylic stain. Mold, mildew, UV and weather resistant.
  - 2. Properties:
    - Viscosity: (72° F) 70°-90° KU
    - pH: 8.5-9.5
    - Finish: flat
    - Nonflammable (ASN/ZS 1530.3-1999)
    - VOC: < 5 g/L (SCAQMDR 1168)
    - Abrasion Resistance: excellent
    - Freeze/Thaw Test (ASTM C216-86): exceeded
    - Salt Attack Resistance (AS/NZS 4456.10): no blisters
    - Water Vapor Transmission (ASTM E96-05) 0.337 g/hr m<sup>2</sup>
    - Water Vapor Permeance (ASTM E96-05) 6.6x10-8 g/Pa s m<sup>2</sup>
    - UV Resistant–Accelerated Weathering
    - (ASTM G154:2000, ASTM G53-88, D2244-89) 2000 hrs: excellent
  - 3. Finish:
    - a. Color: To match existing substrate (masonry or concrete).
    - b. Color: Formulate to color as selected by the Owner or Architect.

# PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that new masonry and concrete have cured at least 21 days prior to applying NawTone.
- C. Verify that surfaces being color treated with NawTone have a neutral pH, are clean, dry and free of efflorescence.

- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.2 PREPARATION
  - A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
  - B. Clean surfaces thoroughly prior to installation. Allow surfaces to dry completely before applying coating.
  - C. Verify that walls, masonry, concrete, stucco, block split faced/fluted and mortar that may have been treated with any form of chemical/acid wash are neutralized.
  - D. Treat alkali or efflorescence with proper neutralizing compounds as recommended by masonry supplier before stain application.
  - E. Before application, verify that the masonry walls have a neutral pH.
  - F. Before application, verify that surface to be treated is clean, dry and contains no frozen water.
  - G. Mix products as recommended immediately prior to application.
- 3.3 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Apply stain using airless spray pump to help control airborne particles or overspray. If site conditions prohibit spray application, apply by hand; utilizing brushes and rollers.
  - C. Do not proceed with work when ambient temperatures are less than 25 degrees F (-4 degrees C) or greater than 110 degrees F (43 degrees C).
  - D. Allow manufacturer's specified drying time for each coat before applying next coat (if required).
  - E. Verify color consistency. Recoat areas where blotches, blemishes or imperfections are present.
- 3.4 FIELD QUALITY CONTROL

A. Verify color consistency. Recoat any areas that are unacceptable.

# 3.5 **PROTECTION**

- A. Protect installed products until completion of project.
- B. Protect prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels as required.
- C. Protect shrubs, metal, wood trim, glass, asphalt and other building hardware during application from overspray.
- D. Do not permit mist (if spraying) or liquid to drift onto surrounding properties or parking lots.
- E. Touch-up, repair or replace damaged products before substantial completion.

# SIGNAGE

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior ADA Parking Sign.
  - 2. Allowance for additional interior signage
  - 3. Street Sign By Owner, not in this contract.
- 1.02 ALLOWANCES
  - A. Cash Allowance: This contractor shall install and furnish the following signage types, and shall allow the sum of <u>\$10,000.00</u> for the purchase and delivery of such signage.
    - 1. "Office and Room" Signage
    - 2. "Donor" wall mounted custom signage
    - 3. "Dedication Plaque" custom wall mounted signage
  - B. Allowance includes purchase and delivery of only. Installation of such signage shall be included in the Contractor's Bid price (approximately 40 hours), not the allowance. Any differential in the allowance listed and the original invoices from suppliers will be adjusted in the contract price.

# 1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."
- 1.4 SUBMITTALS
  - A. Product Data: For each type of product indicated.
  - B. Shop Drawings: Show fabrication and installation details for signs.
    - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
    - 2. Provide message list, typestyles, and graphic elements, including tactile characters and Braille, and layout for each sign.
  - C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors.
  - D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
    - 1. Plaque Casting: 6 inches (150 mm) square including border.
    - 2. Dimensional Characters: Full-size Samples of each type of dimensional character letter, number, and graphic element.
    - 3. Aluminum: For each form, finish, and color, on 6-inch- (150-mm-) long sections of extrusions and squares of sheet at least 4 by 4 inches (100 by 100 mm).
  - E. Sign Schedule: Use same designations indicated on Drawings.
  - F. Maintenance Data: For signs to include in maintenance manuals.
  - G. Warranty: Special warranty specified in this Section.
- 1.5 QUALITY ASSURANCE
  - A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  - B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
  - C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

#### 1.6 **PROJECT CONDITIONS**

- Weather Limitations: Proceed with installation only when existing and forecasted weather conditions A. permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.
- 1.7 COORDINATION
  - Coordinate placement of anchorage devices with templates for installing signs. A.

#### 1.8 WARRANTY

- Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace A. components of signs that fail in materials or workmanship within specified warranty period. 1.
  - Failures include, but are not limited to, the following:
  - Deterioration of metal and polymer finishes beyond normal weathering. a.
  - Deterioration of embedded graphic image colors and sign lamination. b.
  - Warranty Period: Five years from date of Substantial Completion. 2.

#### PART 2 - PRODUCTS

#### 2.1**MATERIALS**

- Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by A. aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- Rooms, Offices & Restroom Tactile and Braille Signage: Per Allowance, Manufacturer's standard B. process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
  - Panel Material: Opaque and translucent acrylic sheet. 1.
  - Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm). 2.
  - 3. Changeable sign inserts.

#### ACCESSORIES 2.2

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansionbolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

#### 2.3 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

- Welded Connections: Comply with AWS standards for recommended practices in shop 1. welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
- 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
- 3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
- 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

#### 2.4 FINISHES, GENERAL

- Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for А. recommendations for applying and designating finishes.
- Β. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

# 2.5 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy **and background** colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for **three** years for application intended.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
  - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.

# 3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

#### FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

#### PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Fire extinguishers. (6 total), Fire Rated Cabinets 3 total, Semi-Recessed Cabinets

#### 1.2 SUBMITTALS

- A. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

#### 1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

# PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. LARSEN'S Architectural Series 2409-R3, Vertical Duo Door, baked enamel interior finish.
- B. Substitutions: Under provisions of the General Requirements.

#### 2.2 EXTINGUISHERS

A. Dry Chemical Type: Larsen's MP series MP5, Cast steel tank, with pressure gage.

# 2.3 CABINETS

- A. Interior Metal: Formed sheet steel, baked enamel box.
- B. Configuration: Semi-recessed type, exterior nominal dimensions of 27 1/2 inch high x 13 inch wide x 5 inch deep.
- C. Trim Type: Returned to wall surface, with 2 1/2 inch projection.
- D. Exterior Door and Trim: Stainless Steel, reinforced for flatness and rigidity; latch with vertical glass.
- E. Door Glazing: Glass, clear, 1/8 inch thick tempered.
- F. Cabinet Mounting Hardware: Appropriate to cabinet.

#### 2.4 FABRICATION

- A. Form cabinet enclosure with right angle inside corners and seams. Formed trimand door stiles.
- B. Pre-drill for anchors.
- C. Hinge doors for 180 degree opening with continuous piano hinge. Provide roller type catch.
- D. Weld, fill, and grind components smooth.
- E. Glaze doors with resilient channel gasket glazing.
- F. Provide Four (4) Fire Rated Cabinet as indicated on Code Footprint plan
- G. PART 3 EXECUTION

# 3.1 EXAMINATION

A. Verify rough openings for cabinet are correctly sized and located.

# 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 24 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.
- E. Verify exact location with Architect.

# 3.3 LOCATIONS

A. Located at Lobby 102, Hall 123, and Staff Lounge 126. Final locations coordinated with Architect/Owner.

# TOILET AND BATH ACCESSORIES

# PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Toilet and washroom accessories.
  - B. Grab bars.
    - C. Attachment hardware.

# PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. BOBRICK WASHROOM EQUIPMENT INC, or BRADLEY CORPORATION.
  - B. Accessory manufacturers as scheduled. BOBRICK and BRADLEY are approved manufacturers provided product is equivalent to scheduled item.
  - C. Substitutions: Under provisions of the General Requirements.

# 2.02 FABRICATION

- A. Weld and grind joints of fabricated components, smooth.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1 1/2 inches clear of wall surface. Knurl grip surfaces.
- D. Shop assemble components and package complete with anchors and fittings.
- E. Provide steel anchor plates, adapters, and anchor components for installation.

# 2.03 FINISHES

- A. Galvanizing: ASTM A123 to 1.25 oz./sq. yd. Galvanize ferrous metal and fastening devices.
- B. Chrome/Nickel Plating: ASTM B456, satin finish.
- C. Stainless Steel: No. 4 satin luster finish.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.
- B. Verify exact location of accessories for installation. Coordinate with ADA requirements.

# 3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation. Provide templates and rough-in measurements as required.

# 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions and Americans with Disabilities Act. Also reference ANSI A117.1.
- B. Install plumb and level, securely and rigidly anchored to substrate.

# 3.04 SCHEDULE

- A. Soap Dispenser, SD: Bobrick B-5050. Typical at all Restroom wall mounted lavatories.(4 total)
- B. Grab Bars, GB: Mount top of bars at 34-36" A.F.F Install 2-piece Grab Bar set at all Handicap toilet stalls. BOBRICK B-6806x36 & B-6806x42, (4-sets total).
- C. Toilet Tissue Dispensers, TP: Bobrick B-5288. Two roll disp. Typical at all water closets (4 total).
- D. Paper Towel Dispenser: PTD. Bobrick B-5262 Surface Mounted type (4 total).
- E. Waste Receptacle: By Owner
- F. Mirrors, M: Install bottom on top of vanity backsplash. Mirrors to be provided by Glass contractor, Reference Section 08900.

#### **BUILDING SPECIALTIES**

#### PART 1 GENERAL

# 1.01 SECTION INCLUDES

A. Building specialties shall be furnished and installed as shown and herein specified. Installation shall be in accordance with the respective manufacturer's instructions. Certain manufacturer's products have been selected as a basic standard, and reference to these products has been made. Other manufacturers' products of equal capacities and design characteristics may be used, if approved by the Architect prior to the Bidding. The Contractor shall submit for approval shop drawings or standard cuts and illustrations or a combination thereof showing all items he proposes to use.

#### 1.02 INTERIOR BUILDING SIGNAGE

- A. Product: Acrylic, custom style Signage to be selected by owner. Mounted by the contractor. Custom signage installation by others. For bid purposes, Contractor shall assume labor costs for mounting all restroom, treatment room, conference room, and office wall signs in the **Base Bid**.. Mounting by adhesive or double-sided tape.
- B. Allowance: Contractor shall include in their bid an **allowance of \$10,000.00** for the purchase and delivery of interior building signage. Contractor shall include all labor and material associated with receiving and installation of signage in his base bid. Anticipated mounting method is assumed to be by double sided tape unless noted otherwise.

#### 1.03 CAST METAL LETTERS

Manufacturer: Gemimi Incorporated, or equal. 1/2 "thick cast aluminum letters with baked enamel finish (full range of color selection) and 3" metal threaded posts on back side of lettering for mounting into masonry. This signage is <u>NOT to be included in the Signage Allowance per Section 01019</u>. All costs associated with installation of this signage shall be included in the Contractor's **Base Bid**.
 1. 20" tall letters to read: "Smile!". Font – Modern Love

#### 1.04 KNOX BOX

- A. Contact: Rossville Fire Department (785) 584-6349 for specification and order forms.
- B. Product: Semi-recessed box.
- C. Quantity: 1-Total. Location to be as directed by the Rossville Fire Marshal.

# 1.05 FIBERGLASS REINFORCED PLASTIC PANELING

- A. Product Class A Minimum .090 thickness panel. Include Manufacturer's vinyl molding at all corners, transitions, joints, and tops, bottoms, etc. Located 2' beyond and 4' above edges of mop or work sinks.
- B. Product shall be applied using manufacturer recommended adhesive and manufacturer recommended mechanical fasteners. Pre-drill rivet holes and silicone caulk prior to riveting.

#### 1.06 FROSTED GLASS DRY ERASE BOARD

- A. Product: Global Industrial glass dry erase boards or equal.
- B. Size 24x36. Located at Staff Lounge 126. Location TBD
- C. Specification Requirements. Thickness- 3/16" Tempered Glass Finish- Frosted & Translucent
- D. Stainless steel mounting standoffs are 1" in diameter and create a 1-1/4" gap from the wall to the board.

# 1.07 PENETRATION FIRESTOPPING DEVICES

- A. Install U.L. listed firestopping systems at pipe penetrations through rated wall and floor assemblies.
- B. Firestopping devices shall be appropriate for the condition being firestopped. Systems shall include but are not limited to firecaulk, pipe collars, pillows, wrap strips, etc.
- C. Contractor shall submit proposed system for approval to Authority Having Jurisdiction.
- D. Manufacturers: 3M fire Protection Products; Hilti; of equivalent systems as approved by AHJ.

#### 1.08 WALL PROTECTION SYSTEMS

- A. Install C/S ACROVYN, surface mounted corner guards, crash rails, handrails and wall panels.
- B. BALCO or IPC corner guard will be considered equal.
- C. Colors as selected by Architect from manufacturer's full range.
- D. Corner Guards
  - a. Height: 48 inches tall (starting from top of base).
  - b. Use SSM-20 at gypsum board corners in hallways.
- E. Crash Rails
  - a. Length as indicated on drawings
  - b. Use SCR -50N, Crescent shape, concealed fastener guards.

#### 1.09 LOCKERS

A.

- Double tier metal lockers, 12"x12"x72" meeting the following requirements:
  - a. 16ga. steel body, 18ga. backs; One piece 16ga. formed and ventilated doors w/ 5-knuckle hinges
  - b. Recessed Handles with integral padlock hasp.
  - c. Coat hook at each side of each locker unit.
  - d. Numbering plates
  - e. Powder coat paint finish
  - f. Angled top.
- B. Reference drawings for location and configuration.
- C. Product equivalent to Lyon Heavy Duty Vented Locker system.

# SECTION 22 05 01 PLUMBING DEMOLITION

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

A. Plumbing demolition.

# PART 2 PRODUCTS (NOT APPLICABLE)

#### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify field measurements, pipe, and equipment arrangements for new work as shown on Drawings.
- B. Prior to submitting bid, visit site and become familiar with scope of demolition work required to accommodate new work.
- C. Refer to Architectural Drawings for additional clarification of scope of demolition and new work.
- D. Verify that abandoned equipment and associated plumbing installation serve only abandoned facilities.
- E. Demolition drawings are based on record drawings and casual field observation .
- F. Report discrepancies to Architect before disturbing existing installation.
- G. Beginning of demolition means installer accepts existing conditions.

# 3.2 PREPARATION

- A. Remove all piping, fixtures, and other plumbing installation where indicated.
- B. Coordinate utility service outages with respective utility company.
- C. Provide temporary connections as required to maintain existing systems in service during construction.
- D. Restore services to items not being removed, but affected by the demolition work required for new construction.

#### 3.3 DEMOLITION OF EXISTING PLUMBING WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove all equipment, controls, piping, fixtures, and other plumbing installation from the project areas as required for new construction. Piping to be removed to source of supply.
- C. Repair adjacent construction and finishes damaged during demolition and extension work.
- D. Maintain access to existing installations that remain active. Modify installation or provide access panels as appropriate.
- E. Extend existing installations using materials and methods compatible with existing installation or as specified.
- 3.4 CLEANING AND REPAIR
  - A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION 22 05 01
# SECTION 22 05 16

# EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

## PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.
- 1.2 SUBMITTALS
  - A. Product Data:
    - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
  - B. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

## PART 2 PRODUCTS

- 2.1 FLEXIBLE PIPE CONNECTORS COPPER PIPING
  - A. Inner Hose: Bronze.
  - B. Exterior Sleeve: Braided bronze.
  - C. Pressure Rating: 125 psi and 450 degrees F.
  - D. Joint: Flanged.
  - E. Size: Use pipe sized units.
  - F. Maximum offset: 3/4 inch on each side of installed center line.
  - G. Application: Copper piping.

# PART 3 EXECUTION

- 3.1 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION 22 05 16

#### SECTION 22 05 29

## HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

#### PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other plumbing work.
- 1.2 REFERENCE STANDARDS
  - A. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
  - B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
  - C. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
  - D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
  - E. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
  - F. MFMA-4 Metal Framing Standards Publication; 2004.
  - G. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.
- 1.4 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- 1.5 QUALITY ASSURANCE
  - A. Comply with applicable building code.

## PART 2 PRODUCTS

- 2.1 SUPPORT AND ATTACHMENT COMPONENTS
  - A. General Requirements:
    - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
    - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

- 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
  - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
  - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
  - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
  - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems:
  - 1. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 2. Comply with MFMA-4.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- D. Thermal Insulated Pipe Supports:
  - 1. General Construction and Requirements:
    - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
    - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
    - c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
    - d. Insulation inserts to consist of polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
  - 2. PVC Jacket:
    - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
    - b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
    - c. Thickness: 60 mil.
- E. Non-Penetrating Rooftop Supports for Low-Slope Roofs:
  - 1. Manufacturers:
    - a. Erico International Corporation, a brand of Pentair
  - 2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
  - 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
  - 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
  - 5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- F. Anchors and Fasteners:
  - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
  - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
  - 4. Hollow Masonry: Use toggle bolts.
  - 5. Hollow Stud Walls: Use toggle bolts.
  - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
  - 7. Sheet Metal: Use sheet metal screws.

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND

- 8. Wood: Use wood screws.
- 9. Plastic and lead anchors are not permitted.
- 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
  - a. Comply with MFMA-4.
  - b. Channel Material: Use galvanized steel.
  - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

# PART 3 EXECUTION

# 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to stude to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.

## END OF SECTION 22 05 29

# SECTION 22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

## PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Nameplates.
  - B. Tags.
  - C. Pipe Markers.
  - D. Ceiling tacks.
- 1.2 REFERENCE STANDARDS
  - A. ASME A13.1 Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- 1.3 SUBMITTALS
  - A. See Division 1 Section Administrative Requirements, for submittal procedures.
  - B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
  - C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
  - D. Product Data: Provide manufacturers catalog literature for each product required.
  - E. Project Record Documents: Record actual locations of tagged valves.

# PART 2 PRODUCTS

## 2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch.
  - 3. Background Color: Black.
- 2.2 TAGS
  - A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
  - B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
  - C. Chart: Typewritten letter size list in anodized aluminum frame.

# 2.3 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- 2.4 CEILING TACKS
  - A. Description: Steel with 3/4 inch diameter color coded head.
  - B. Color code as follows:
    - 1. Plumbing Valves: Green.

## PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.

IDENTIFICATION FOR PLUMBING PIPING AND

- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
  - 1. Identify service, flow direction, and pressure.
  - 2. Install in clear view and align with axis of piping.
  - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Identify equipment with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- H. Identify control panels and major control components outside panels with plastic nameplates.
- I. Identify valves in main and branch piping with tags.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 22 05 53

# SECTION 22 07 19 PLUMBING PIPING INSULATION

#### PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

# 1.2 REFERENCE STANDARDS

- A. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- B. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- C. ASTM C449 Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- D. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- E. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation; 2017.
- F. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- G. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- H. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- I. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

# 1.3 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of experience.
  - B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- 1.6 FIELD CONDITIONS
  - A. Maintain ambient conditions required by manufacturers of each product.
  - B. Maintain temperature before, during, and after installation for minimum of 24 hours.

# PART 2 PRODUCTS

# 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- 2.2 GLASS FIBER
  - A. Manufacturers:
    - 1. Knauf Insulation: www.knaufusa.com.

- 2. Johns Manville Corporation: www.jm.com.
- 3. Owens Corning Corp: www.owenscorning.com.
- 4. CertainTeed Corporation: www.certainteed.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 250 degrees F.
  - 3. Maximum moisture absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 250 degrees F.
  - 3. Maximum moisture absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Vapor Barrier Lap Adhesive:
  - 1. Compatible with insulation.
- F. Insulating Cement/Mastic:
  - 1. ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
  - 1. Cloth: Untreated; 9 oz/sq yd weight.
  - 2. Blanket: 1.0 lb/cu ft density.
  - 3. Weave: 5x5.
- H. Indoor Vapor Barrier Finish:
  - 1. Cloth: Untreated; 9 oz/sq yd weight.
  - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- I. Insulating Cement:
  - 1. ASTM C449/C449M.

## 2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
  - 1. Armacell LLC: www.armacell.us/#sle.
  - 2. K-Flex USA: www.kflexusa.com.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 1; use molded tubular material wherever possible.
  - 1. Minimum Service Temperature: -40 degrees F.
  - 2. Maximum Service Temperature: 220 degrees F.
  - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

## 2.4 JACKETS

A. PVC Plastic.

1.

- Jacket: One piece molded type fitting covers and sheet material, off-white color.
  - a. Minimum Service Temperature: 0 degrees F.
  - b. Maximum Service Temperature: 150 degrees F.
  - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
  - d. Thickness: 10 mil.
  - e. Connections: Brush on welding adhesive.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

# 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Inserts and Shields:
  - 1. Application: Piping 2-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  - 3. Insert location: Between support shield and piping and under the finish jacket.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Firestopping Section.
- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

## 3.3 SCHEDULES

1.

- A. Domestic Cold Water:
  - 1. Glass Fiber Insulation:
    - a. Pipe Size Range: 1/2 through 1-1/4 inch.
    - b. Thickness: 1/2 inch.
  - 2. Glass Fiber Insulation:
    - a. Pipe Size Range: Above 1-1/4 inch
    - b. Thickness: 1 inch
- B. Domestic Hot, and Recirculated Hot Water:
  - Glass Fiber Insulation:
    - a. Pipe Size Range: 1/2 through 1-1/4 inch.
    - b. Thickness: 1 inch.
- C. Roof Drain Bodies: 1" thick glass fiber
- D. Roof Drainage Above Grade: 1" thick glass fiber. Omit in vertical runs concealed in walls if available space does not allow installation of insulation.
- E. Other Systems:
  - 1. Drains from water coolers: 1/2" elastomeric

END OF SECTION 22 07 19

# SECTION 22 10 05 PLUMBING PIPING

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Gas.
  - 4. Flanges, unions, and couplings.
  - 5. Pipe hangers and supports.
  - 6. Valves.
  - 7. Relief valves.
  - 8. Sleeves
  - 9. Sleeve seals
  - 10. Grout
  - 11. Escutcheons
- 1.2 RELATED REQUIREMENTS
  - A. Section Firestopping.
  - B. Section 220553 Identification for Plumbing Piping and Equipment.
  - C. Section 22 07 19 Plumbing Piping Insulation.
- 1.3 REFERENCE STANDARDS
  - A. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
  - B. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
  - C. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
  - D. ASME B31.1 Power Piping; 2016.
  - E. ASME B31.9 Building Services Piping; 2014.
  - F. ASSE 1003 Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.
  - G. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2017.
  - H. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
  - I. ASTM B42 Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.
  - J. ASTM B88 Standard Specification for Seamless Copper Water Tube; 2016.
  - K. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
  - L. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
  - M. ASTM D2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.
  - N. ASTM D2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
  - O. ASTM D2729 Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
  - P. ASTM D2855 Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.

- Q. ASTM F708 Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- R. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing; 2015.
- S. NSF/ANSI 61 Drinking Water Systems Components Health Effects
- T. AWWA C550 Protective Interior Coatings for Valves and Hydrants; 2017.
- U. AWWA C651 Disinfecting Water Mains; 2014.
- V. CISPI 301 Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009 (Revised 2012).
- W. CISPI 310 Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011 (Revised 2012).
- X. ICC-ES AC01 Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- Y. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- Z. MSS SP-67 Butterfly Valves; 2017.
- AA. MSS SP-78 Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
- AB. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AC. NSF 372 Drinking Water System Components Lead Content; 2016.
- AD. PPI TR-4 PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe; 2017.

#### 1.4 SUBMITTALS

- A. See Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual routing of piping. Record actual locations of valves.
- 1.5 QUALITY ASSURANCE
  - A. Perform Work in accordance with City of Rossville standards.
  - B. Where joining systems specific to a piping manufacturer are used, personnel shall receive factory authorized training prior to installation, and submit evidence of such training for review.
  - C. Valves: Manufacturer's name and pressure rating marked on valve body.
  - D. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- 1.6 REGULATORY REQUIREMENTS
  - A. Perform Work in accordance with City of Rossville, plumbing code.
  - B. Conform to applicable code for installation of backflow prevention devices.
- 1.7 DELIVERY, STORAGE, AND HANDLING
  - A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
  - B. Provide temporary protective coating on cast iron and steel valves.
  - C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
  - D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- 1.8 FIELD CONDITIONS
  - A. Do not install underground piping when bedding is wet or frozen.

## PART 2 PRODUCTS

- 2.1 GENERAL REQUIREMENTS
  - A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- 2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING
  - A. Cast Iron Pipe: CISPI 301, hubless.
    - 1. Fittings: Cast iron.
    - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
  - B. PVC Pipe: ASTM D2665 or ASTM D3034.
    - 1. Fittings: PVC.
    - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

#### 2.3 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. PVC Pipe: ASTM D2729.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

#### 2.4 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
  - 2. Joints: ASTM B32, alloy Sn95 solder.
  - 3. Joints: ASTM B 32, alloy Sn95 solder.
- B. PE Pipe: ASTM D2239, or ASTM D2447 Schedule 40.
  - 1. Fittings: ASTM D2609, PE.
  - 2. Joints: Mechanical with stainless steel clamp.
- 2.5 WATER PIPING, ABOVE GRADE
  - A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
    - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
    - 2. Joints: ASTM B32, alloy Sn95 solder.
  - B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
    - 1. Manufacturers:
      - a. Uponor, Inc: www.uponorengineering.com/#sle.
      - b. Viega LLC: www.viega.com/#sle.
    - 2. PPI TR-4 Pressure Design Basis:
    - 3. Fittings: Brass and copper.
    - 4. Fittings: Brass and engineered polymer (EP) ASTM F1960.
    - 5. Joints: Mechanical compression fittings.
    - 6. Joints: ASTM F1960 cold-expansion fittings.
  - C. Polypropylene Pipe (PP-R): Pipe and fittings shall be manufactured from a beta crystalline PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389 and CSA B137.11. Pipe and fittings made from a PP-RCT (PPRP) material that is made from a terpolymer, or made from standard PPR material are unacceptable. All pipe and fitting material shall be pigmented as solid steel grey in color, except for any outside UV protective layer, which may be black or white.
    - 1. Pipe shall be equivalent to Niron Clima Pipe and shall be listed for potable water (shall have listings to NSF 14 and 61g), regardless of the whether the pipe and fittings are to be used for potable water service or HVAC service. All pipe shall be made in an extrusion process and shall be

pigmented as solid steel grey in color. The piping shall be extruded with a middle layer that has glass fiber content to restrict thermal expansion.

- 2. Fittings shall be manufactured from a PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. All fittings shall comply with NSF 14, ASTM F 2389 and CSA B137.11. Fittings shall be Niron PP-RCT piping as manufactured by Nupi Americas of Houston, TX.
- 3. Fittings may be either socket fusion through nominal 5 inch (125 mm), electrofusion through 8 inch (200mm) or butt fusion in nominal 2 inch through 24 inch sizes (63mm through 630 mm). Electrofusion may also be performed in nominal sizes 10 inch through 24 inch (250mm through 630mm) by means of the use of electrofusion couplings as applied on butt fusion fittings and pipe.
- 4. Pipe and fittings shall be covered by a factory warranty for 30 years to be free of defects in materials or manufacturing.
- 5. Where standard pipe insulation is indicated on the drawings or in these specifications, the contractor shall provide a thermal (radiant, conductive, and convective) and vapor barrier insulation. The insulation products shall be provided in appropriate thickness or as indicated on the drawings or elsewhere in these specifications.
- D. Mechanical joint system: Manufacturer's fittings and joining methods, for pipe materials and sizes.
   1. Viega

## 2.6 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  - 2. Joints: Threaded or welded to ASME B31.1.

# 2.7 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
  - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
  - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## 2.8 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
  - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
  - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
  - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping Drain, Waste, and Vent:
  - 1. Conform to ASME B31.9.
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  - 7. Vertical Support: Steel riser clamp.
- C. Plumbing Piping Water:
  - 1. Conform to ASME B31.9.
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  - 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
  - 5. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

- 6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
- 7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- 8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
- 9. Vertical Support: Steel riser clamp.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  - 1. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  - 2. Other Types: As required.

#### 2.9 BALL VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Conbraco Industries: www.conbraco.com.
  - 3. Nibco, Inc: www.nibco.com.
  - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
  - 5. Substitutions: See Section 01 60 00 Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.
- 2.10 PLUG VALVES
  - A. Construction 2-1/2 Inches and Larger: 1, 175 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

## 2.11 BUTTERFLY VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Hammond Valve: www.hammondvalve.com.
  - 3. Crane Co.: www.cranevalve.com.
  - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
  - 5. Substitutions: See Section 01 60 00 Product Requirements.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

## 2.12 FLOW CONTROLS

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. ITT Bell & Gossett: www.bellgossett.com.
  - 3. Griswold Controls: www.griswoldcontrols.com.
  - 4. Taco, Inc: www.taco-hvac.com.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

#### 2.13 SPRING LOADED CHECK VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Hammond Valve: www.hammondvalve.com.
  - 3. Crane Co.: www.cranevalve.com.
  - 4. Milwaukee Valve Company: www.milwaukeevalve.com.

- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.
- 2.14 WATER PRESSURE REDUCING VALVES
  - A. Manufacturers:
    - 1. Amtrol Inc: www.amtrol.com.
    - 2. Cla-Val Co: www.cla-val.com.
    - 3. Watts Regulator Company: www.wattsregulator.com.
  - B. Up to 2 Inches:
    - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
  - C. Over 2 Inches:
    - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

# 2.15 RELIEF VALVES

- A. Temperature and Pressure Relief:
  - 1. Manufacturers:
    - a. Cla-Val Co: www.cla-val.com.
    - b. Henry Technologies: www.henrytech.com.
    - c. Watts Regulator Company: www.wattsregulator.com.
  - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

## 2.16 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

## 2.17 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
  - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 2. Pressure Plates: Carbon steel.
  - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

## 2.18 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.
- 2.19 ESCUTCHEONS
  - A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
  - B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
  - C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
  - D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, exposed-rivet hinge, and spring-clip fasteners.

## PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that excavations are to required grade, dry, and not over-excavated.
- 3.2 PREPARATION
  - A. Ream pipe and tube ends. Remove burrs.
  - B. Remove scale and dirt, on inside and outside, before assembly.
  - C. Prepare piping connections to equipment with flanges or unions.

# 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.
- H. Provide access where valves and fittings are not exposed.
- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Piping serving kitchen drainage shall be cast iron from fixtures to grease interceptor.
- L. TRENCHING
  - 1. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
  - 2. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
  - 3. Do not interfere with 45 degree bearing splay of foundations.
  - 4. Cut trenches wide enough to allow inspection of installed utilities.
  - 5. Hand trim excavations. Remove loose matter.
  - 6. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
  - 7. Remove excavated material that is unsuitable for re-use from site.
  - 8. Remove excess excavated material from site.
- M. BACKFILLING
  - 1. Fill up to subgrade elevations unless otherwise indicated.
  - 2. Employ a placement method that does not disturb or damage other work.
  - 3. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
  - 4. Maintain optimum moisture content of fill materials to attain required compaction density.
  - 5. Sand Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.
- P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

- Q. Install water piping to ASME B31.9.
- R. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- S. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- T. Do not use PVC piping in return air plenums.
- U. PP Piping: Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting type. All fusion-well joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
- V. PP and PEX may be used in return air plenums if rated for such use by manufacturer.
- W. The use of PEX piping shall be limited to 1" and smaller unless noted otherwise.
- X. All stubouts to fixtures shall be copper.
- Y. SLEEVE INSTALLATION
  - 1. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
  - 2. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
    - a. Sleeves are not required for core-drilled holes.
  - 3. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
    - a. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
    - b. Cut sleeves to length for mounting flush with both surfaces.
      - 1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
    - c. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
  - 4. Install sleeves for pipes passing through interior partitions.
    - a. Cut sleeves to length for mounting flush with both surfaces.
    - b. Install sleeves that are large enough to provide 1/4-inchannular clear space between sleeve and pipe or pipe insulation.
    - c. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in other sections.
  - 5. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in other sections.
- Z. SLEEVE-SEAL-SYSTEM INSTALLATION
  - 1. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
  - 2. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

# AA. ESCUTCHEONS

- 1. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- 2. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
  - a. Escutcheons Schedule:
    - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - 2) Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.

- 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
- 4) Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
- 5) Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.
- 6) Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.

# AB. Inserts:

- 1. Provide inserts for placement in concrete formwork.
- 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- AC. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Provide copper plated hangers and supports for copper piping.
  - Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 22 05 48.
  - 9. Support cast iron drainage piping at every joint.
- 3.4 APPLICATION
  - A. Install unions downstream of valves and at equipment or apparatus connections.
  - B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
  - C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
  - D. Provide spring loaded check valves on discharge of water pumps.
  - E. Provide plug valves in natural gas systems for shut-off service.
  - F. Provide flow controls in water recirculating systems where indicated.
- 3.5 TOLERANCES
  - A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

# 3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

#### 3.7 SERVICE CONNECTIONS

- A. Provide new domestic water service.
- B. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 7 inch wg. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

## 3.8 SCHEDULES

A. Pipe Hanger Spacing:

c.

- 1. Metal Piping:
  - a. Pipe size: 1/2 inches to 1-1/4 inches:
    - 1) Maximum hanger spacing: 6.5 ft.
    - 2) Hanger rod diameter: 3/8 inches.
  - b. Pipe size: 1-1/2 inches to 2 inches:
    - 1) Maximum hanger spacing: 10 ft.
    - 2) Hanger rod diameter: 3/8 inch.
    - Pipe size: 2-1/2 inches to 3 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 1/2 inch.
  - d. Pipe size: 4 inches to 6 inches:
    - 1) Maximum hanger spacing: 10 ft.
    - 2) Hanger rod diameter: 5/8 inch.
- 2. Plastic Piping:
  - a. All Sizes:
    - 1) Maximum hanger spacing: 6 ft.
    - 2) Hanger rod diameter: 3/8 inch.

END OF SECTION 22 10 05

# SECTION 22 10 06 PLUMBING PIPING SPECIALTIES

#### PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Cleanouts.
- B. Hydrants.
- C. Water hammer arrestors.
- 1.2 REFERENCE STANDARDS
  - A. ASSE 1011 Hose Connection Vacuum Breakers; 2004.
  - B. ASSE 1019 Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
- 1.3 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

# PART 2 PRODUCTS

# 2.1 CLEANOUTS

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
  - 2. Josam Company: www.josam.com/#sle.
  - 3. Zurn Industries, Inc: www.zurn.com/#sle.
  - 4. Sioux Chief Manufacturing.
- B. Cleanouts at Exterior Surfaced Areas:
  - 1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Exterior Unsurfaced Areas:
  - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- D. Cleanouts at Interior Finished Floor Areas (FFCO):
  - 1. Lacquered cast iron body with anchor flange, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- E. Cleanouts at Interior Finished Wall Areas (FWCO):
  - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- F. Cleanouts at Interior Unfinished Accessible Areas: Caulked or threaded type.

# 2.2 HOSE BIBBS

- A. Interior Hose Bibbs:
  - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with handwheel, integral vacuum breaker in conformance with ASSE 1011.

## 2.3 HYDRANTS

- A. Wall Hydrants:
  - 1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, lockshield and removable key, and integral vacuum breaker.

## PART 3 EXECUTION

## 3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install water hammer arrestors on cold water supply piping to flush valve or solenoid operated fixtures. . Install as recommended by hammer arrestor manufacturer.
- F. Install cleanouts at locations required by the International Plumbing Code (IPC), whether or not specifically indicated on the drawings. Such locations include, but are not limited to the following:
  - 1. Junction of building drain and building sewer (utilize 2-way cleanout at this location).

## END OF SECTION 22 10 06

# SECTION 22 30 00 PLUMBING EQUIPMENT

PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Water heaters.
- B. Pumps.
  - 1. Circulators.

# 1.2 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 Boiler and Pressure Vessel Code, Section VIII, Division 1 Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2013.
- B. ICC (IPC) International Plumbing Code; 2012.
- C. UL 174 Standard for Household Electric Storage Tank Water Heaters; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- D. UL 778 Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.
- E. UL 1453 Standard for Electric Booster and Commercial Storage Tank Water Heaters; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- 1.3 SUBMITTALS
  - A. Product Data:
    - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
    - 2. Indicate pump type, capacity, power requirements.
    - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
    - 4. Provide electrical characteristics and connection requirements.
  - B. Shop Drawings:
    - 1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
  - C. Project Record Documents: Record actual locations of components.
  - D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
  - E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
  - B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
  - C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

## 1.5 CERTIFICATIONS

- A. Water Heaters: NSF approved.
- B. Electric Water Heaters: UL listed and labeled to UL 174 or UL 1453.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

- 1.7 WARRANTY
  - A. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

- 2.1 WATER HEATER MANUFACTURERS
  - A. A.O. Smith Water Products Co: www.hotwater.com.
  - B. Rheem Manufacturing Company: www.rheem.com.
- 2.2 GAS FIRED STORAGE WATER HEATERS
  - A. Type: Automatic, natural gas-fired, vertical storage.
  - B. Performance: As indicated on drawings.
  - C. Tank: Glass lined welded steel with single flue passage, flue baffle and draft hood; thermally insulated and encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
    1. Insulation: Glass fiber.
  - D. Controls: Automatic water thermostat and built-in gas pressure regulator; temperature range adjustable from 120 to 170 degrees F, cast iron or sheet metal burner, safety pilot and thermocouple.
  - E. Accessories: Provide:
    - 1. Water Connections: Brass.
    - 2. Dip Tube: Brass.
    - 3. Drain Valve.
    - 4. Anode: Magnesium.
    - 5. Temperature and Pressure Relief Valve: ASME labelled.
- 2.3 DIAPHRAGM-TYPE COMPRESSION TANKS
  - A. Manufacturers:
    - 1. Amtrol Inc: www.amtrol.com/#sle.
    - 2. ITT Bell & Gossett: www.bellgossett.com.
    - 3. Taco, Inc: www.taco-hvac.com.
  - B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
  - C. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig.
- 2.4 IN-LINE CIRCULATOR PUMPS
  - A. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
  - B. Impeller: Bronze.
  - C. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
  - D. Seal: Carbon rotating against a stationary ceramic seat.
  - E. Drive: Flexible coupling.

## PART 3 EXECUTION

- 3.1 INSTALLATION
  - A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
  - B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
  - C. Pumps:
    - 1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.

- 2. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
- 3. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

# END OF SECTION 22 30 00

# SECTION 22 40 00 PLUMBING FIXTURES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Fixtures
- 1.2 REFERENCE STANDARDS
  - A. ASHRAE Std 18 Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
  - B. ASME A112.6.1M Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).
  - C. ASME A112.18.1 Plumbing Supply Fittings; 2012.
  - D. ASME A112.19.2 Ceramic Plumbing Fixtures; 2013.
  - E. ASME A112.19.3 Stainless Steel Plumbing Fixtures (Designed for Residential Use); 2008 (R2013).
  - F. ASME A112.19.5 Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2011.

# 1.3 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.1. Extra Faucet Washers: Two sets of each type and size.
- 1.4 DELIVERY, STORAGE, AND HANDLING
  - A. Accept fixtures on site in factory packaging. Inspect for damage.
  - B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.
- 1.5 WARRANTY
  - A. Provide five year manufacturer warranty for electric water cooler.
- PART 2 PRODUCTS
- 2.1 FIXTURES
  - A. Scheduled on drawings
  - B. Substitutions permitted, provided products are functionally and materially equivalent to those scheduled. Substitutions must be approved by Engineer in writing, prior to bidding. Requests for substitution must be received at least 5 work days prior to bidding.

## PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
  - B. Verify that electric power is available and of the correct characteristics.
  - C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.
  - D. Reference Architectural drawings for exact locations of fixtures.

# 3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

# 3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.

# 3.4 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- 3.5 ADJUSTING
  - A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

# 3.6 CLEANING

A. Clean plumbing fixtures and equipment.

# 3.7 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

# 3.8 SCHEDULES

A. On Drawings

# END OF SECTION 22 40 00

# SECTION 22 60 10 DENTAL AIR AND VACUUM SYSTEMS

#### PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Dental compressed air system.
  - B. Dental vacuum system.
- 1.2 RELATED REQUIREMENTS
  - A. Section 07 84 00 Firestopping.
  - B. Section 22 05 53 Identification for Plumbing Piping and Equipment.
  - C. Section 22 10 05 Plumbing Piping
- 1.3 REFERENCE STANDARDS
  - A. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
  - B. ASTM B88 Standard Specification for Seamless Copper Water Tube; 2016.
  - C. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric); 2016.
  - D. ASTM D1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015, with Editorial Revision (2018).
  - E. ASTM D2466 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2017.
  - F. ASTM D2672 Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.
  - G. AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).
  - H. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
  - I. NFPA 99 Health Care Facilities Code; 2018.
- 1.4 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide manufacturers literature for pipe and fittings.
  - C. Independent Testing Agency Reports: Indicate systems are complete, and pressure and cross connections tests performed. Document tests. Submit initial and final test reports in accordance with NFPA 99-2018.
  - D. Manufacturer's Instructions: Indicate installation requirements for equipment and systems.
  - E. Manufacturer's Field Reports: Indicate systems are complete, zone valves installed, and alarm systems functional.
  - F. Project Record Documents: Record actual locations of piping, valving, and outlets.
- 1.5 QUALITY ASSURANCE
  - A. Perform Work in accordance with NFPA 99.
  - B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
  - C. Comply with applicable codes for medical gas systems.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Accept material on site in factory containers and packing. Inspect for damage.
  - B. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

# PART 2 PRODUCTS

- 2.1 PIPE AND FITTINGS
  - A. Compressed Air Systems:
    - 1. Copper Tube: ASTM B88 (ASTM B88M), Type K.
    - 2. Fittings: ASME B16.22, wrought copper.
    - 3. Joints: AWS A5.8M/A5.8 Classification BCuP-3 or BCuP-4 silver braze.
  - B. Oral Evacuation Systems:
    - 1. PVC Pipe: ASTM D1785, PVC 1120 or 1220, Schedule 40.
    - 2. Fittings: ASTM D2466, PVC long radius or wye type.
    - 3. Joints: Solvent-cemented in accordance with ASTM D2672.
- 2.2 PIPING ACCESSORIES
  - A. Hangers and Supports: MSS SP-58 with types as required.
  - B. Flexible Connectors: Corrugated flexible, single ply, seamless or seam-welded tubing of stainless steel or bronze or reinforced teflon bellows or hose.
  - C. Piping Identification: Pressure sensitive adhesive tape and decals, color and labeling to comply with Section 22 05 53.

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with NFPA 99.
- B. Braze joints in pipe and tubing. Avoid leaving excess flux inside of pipe and fittings. During brazing of pipe connections, purge interior of pipe continuously with nitrogen.
- C. Effect changes in size with reducing fittings. Make changes in direction of required turns or offsets with fittings or tubing shaped by bending tools. Make bends free of flattening, buckling or thinning of tube wall.
- D. Cut pipe and tubing accurately and install without springing or forcing.
- E. Grade piping down in direction of flow.
- F. Provide pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Finish flush at both ends. Extend 2 inches above finished floors. Pack space between pipe or tubing and sleeve, and calk.
- G. Identify piping with tape and decals. Provide piping identification code and schematic for installation under provisions of Section 22 05 53. Install labeling on pipe at intervals of not more than 20 feet and at least once in each room and each story traversed by pipeline.
- H. TRENCHING
  - 1. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
  - 2. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
  - 3. Do not interfere with 45 degree bearing splay of foundations.
  - 4. Cut trenches wide enough to allow inspection of installed utilities.
  - 5. Hand trim excavations. Remove loose matter.
  - 6. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
  - 7. Remove excavated material that is unsuitable for re-use from site.
  - 8. Remove excess excavated material from site.
- I. BACKFILLING
  - 1. Fill up to subgrade elevations unless otherwise indicated.
  - 2. Employ a placement method that does not disturb or damage other work.
  - 3. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

- 4. Maintain optimum moisture content of fill materials to attain required compaction density.
- 5. Sand Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- J. Support gas piping with pipe hooks or hangers suitable for size of pipe, spaced:
  - 1. 1/2 inch pipe or tubing: 72 inches.
  - 2. 3/4 inch pipe or tubing: 84 inches.
  - 3. 1 inch pipe or tubing: 96 inches.
  - 4. 1-1/4 inch pipe or tubing: 108 inches.
  - 5. Pipe or tubing 1-1/2 inch and larger: 120 inches.
  - 6. Vertical risers, all sizes: Support at every floor, not to exceed 180 inches.
- K. Provide air compressors and vacuum pumps with water supply piped from potable water system as required by equipment manufacturer. Provide reduced pressure back flow preventer on water supply.

# 3.2 PIPING SYSTEMS CLEANING AND PRESSURE TESTING

A. After erection of pipe and tubing but prior to installation of service outlet valves, blow systems clear of free moisture and foreign matter with nitrogen gas.

# 3.3 FIELD QUALITY CONTROL

- A. Independent testing agency to certify system is complete and tests performed. Document tests and submit. Testing shall be in accordance with NFPA 99-2018.
- B. Initial Pressure Test:
  - 1. Plastic vacuum piping shall not be pressure tested.
  - 2. Dental air piping systems shall be tested to 150 psi.
- C. Final Pressure Test:
  - 1. Dental air piping shall be subject to 24 hour standing pressure test using oil free dry nitrogen.
  - 2. Test pressure shall be 20 percent above normal system line pressure. Coordinate with dental air compressor supplier.
- D. Standing Vacuum Test:
  - 1. Plastic vacuum piping shall be subject to a 24 hour standing vacuum test.
  - 2. Test pressure shall be between 12" Hg and full vacuum.

END OF SECTION 22 60 10

# SECTION 23 00 01 MECHANICAL DEMOLITION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Mechanical demolition.

# PART 2 PRODUCTS

- 2.1 MATERIALS AND EQUIPMENT
  - A. Materials and equipment for patching and extending work: As specified in individual sections.

# PART 2 PRODUCTS (NOT APPLICABLE)

# PART 3 EXECUTION

# 4.1 EXAMINATION

- A. Verify field measurements, pipe, ductwork, and equipment arrangements for new work as shown on Drawings.
- B. Prior to submitting bid, visit site and become familiar with scope of demolition work required to accommodate new work.
- C. Refer to Architectural Drawings for additional clarification of scope of demolition and new work.
- D. Verify that abandoned equipment and associated mechanical installation serve only abandoned facilities.
- E. Demolition drawings are based on casual field observation .
- F. Should the contractor encounter any existing conditions related to the project area that prevent the work from being performed as indicated or described, contact the Architect immediately.
- G. Report discrepancies to Architect before disturbing existing installation.
- H. Beginning of demolition means installer accepts existing conditions.
- 4.2 DEMOLITION OF EXISTING MECHANICAL WORK
  - A. Remove existing installations as indicated on drawings and as required to accommodate new work.
  - B. Remove abandoned equipment, controls, air devices, ductwork, piping, fixtures, and other mechanical installation. Piping and ductwork to be removed to source of supply.
  - C. Repair adjacent construction and finishes damaged during demolition and extension work.
  - D. Maintain access to existing mechanical installations that remain active. Modify installation or provide access panels as appropriate.
- 4.3 CLEANING AND REPAIR
  - A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION 23 00 01
#### SECTION 23 05 93

## TESTING, ADJUSTING, AND BALANCING FOR HVAC

#### PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.
- 1.2 RELATED REQUIREMENTS
- 1.3 REFERENCE STANDARDS
  - A. AABC MN-1 AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
  - B. NEBB (TAB) Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).

## 1.4 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Submit to the Construction Manager within two weeks after completion of testing, adjusting, and balancing.
  - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
  - 3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
  - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 6. Units of Measure: Report data in I-P (inch-pound) units only.
  - 7. Include the following on the title page of each report:
    - a. Name of Testing, Adjusting, and Balancing Agency.
    - b. Address of Testing, Adjusting, and Balancing Agency.
    - c. Telephone number of Testing, Adjusting, and Balancing Agency.
    - d. Project name.
    - e. Project location.
    - f. Report date.
- D. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

## PART 2 PRODUCTS - NOT USED

# PART 3 EXECUTION

# 3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC MN-1, AABC National Standards for Total System Balance.
  - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
  - 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Having minimum of three years documented experience.
  - 3. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
- E. TAB Supervisor Qualifications: Professional Engineer licensed in Kansas.

## 3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 5. Duct systems are clean of debris.
  - 6. Fans are rotating correctly.
  - 7. Fire and volume dampers are in place and open.
  - 8. Air coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.
  - 10. Air outlets are installed and connected.
  - 11. Duct system leakage is minimized.
  - 12. Hydronic systems are flushed, filled, and vented.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.
- 3.3 PREPARATION
  - A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
    - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
  - B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
  - C. Provide additional balancing devices as required.

## 3.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

## 3.5 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
  - 1. Running log of events and issues.
  - 2. Discrepancies, deficient or uncompleted work by others.
  - 3. Contract interpretation requests.
  - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.

- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

#### 3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities .
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

# 3.7 SCOPE

- A. Test, adjust, and balance the following:
  - 1. Packaged Roof Top Heating/Cooling Units.
  - 2. Computer Room Air Conditioning Units.
  - 3. Terminal Heat Transfer Units.
  - 4. Fans
  - 5. Air Inlets and Outlets
- 3.8 MINIMUM DATA TO BE REPORTED
  - A. Electric Motors:
    - 1. Manufacturer
    - 2. Model/Frame
    - 3. HP/BHP
    - 4. Phase, voltage, amperage; nameplate, actual, no load
    - 5. RPM
    - 6. Service factor
    - 7. Starter size, rating, heater elements
    - 8. Sheave Make/Size/Bore
  - B. Terminal Unit Data:
    - 1. Manufacturer
    - 2. Type, constant, variable, single, dual duct
    - 3. Location

- 4. Model number
- 5. Size
- 6. Minimum static pressure
- 7. Minimum design air flow
- 8. Maximum design air flow
- 9. Maximum actual air flow
- C. Air Distribution Tests:
  - 1. Room number/location
  - 2. Terminal type
  - 3. Design air flow
  - 4. Test (final) air flow
  - 5. Percent of design air flow

# END OF SECTION 23 05 93

# SECTION 23 07 13 DUCT INSULATION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Duct insulation.
  - B. Duct Liner.
- 1.2 RELATED REQUIREMENTS
- 1.3 REFERENCE STANDARDS
  - A. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
  - B. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
  - C. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
  - D. ASTM C916 Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
  - E. ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.
  - F. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
  - G. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
  - H. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
  - I. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
  - J. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
  - K. ASTM C 1338 Fungi Resistance
  - L. ASTM G 22 Bacterial Resistance
- 1.4 SUBMITTALS
  - A. See Division 1 Section Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
  - C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.
- 1.5 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
  - B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experienceand approved by manufacturer.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
  - B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

## 1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## PART 2 PRODUCTS

- 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
  - A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.
- 2.2 GLASS FIBER, FLEXIBLE
  - A. Manufacturer:
    - 1. Knauf Insulation: www.knaufusa.com.
    - 2. Johns Manville Corporation: www.jm.com/#sle.
    - 3. Owens Corning Corp: www.owenscorning.com/#sle.
    - 4. CertainTeed Corporation; : www.certainteed.com/#sle.
  - B. Insulation: ASTM C553; flexible, noncombustible blanket.
    - 1. 'K' value: 0.25 at 75 degrees F, when tested in accordance with ASTM C518.
    - 2. Maximum Water Vapor Sorption: 5.0 percent by weight.
  - C. Vapor Barrier Jacket:
    - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
    - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
    - 3. Secure with pressure sensitive tape.
  - D. Vapor Barrier Tape:
    - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

# 2.3 DUCT LINER

- A. Manufacturers:
  - 1. Armacell LLC; AP Coilflex: www.armacell.us/#sle.
- B. Elastomeric Foam Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
  - 1. Minimum Service Temperature: Minus 40 degrees F.
  - 2. Maximum Service Temperature: 180 degrees F.
  - 3. Fungal Resistance: No growth when tested according to ASTM G21.
  - 4. Apparent Thermal Conductivity: Maximum of 0.28 at 75 degrees F.
  - 5. Minimum Noise Reduction Coefficients:
    - a. 1/2 inch Thickness: 0.30.
  - 6. Erosion Resistance: Does not show evidence of breaking away, flaking off, or delamination at velocities of 10,000 fpm per ASTM C1071.
  - 7. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation. Comply with ASTM C916.
- D. Insulation material shall be a flexible, closed-cell or conformable, elastomeric insulation in sheet form: AP Armaflex AP Armaflex SA, and AP Coilflex. These products meets the requirements as defined in ASTM C 534, Grade 1 Type II, "Specification for preformed elastomeric cellular thermal insulation in sheet and tubular form".
  - 1. AP Armaflex and AP Armaflex SA insulation materials shall have a closed cell structure to prevent moisture from wicking and effectively retard heat gain to make it an efficient insulation. AP Coilflex has a conformable cell structure allowing it to be bent on a coil line brake for tight fit in the corners.

- 2. Insulation materials shall be manufactured without the use of CFC's, HFC's or HCFC's. It shall be formaldehyde-free, low VOCs, fiber free, dust free and resist mold and mildew.
- 3. The insulation material shall conform to meet the requirements as defined in ASTM C 1534, Standard "Specification for Flexible Polymeric Foam Sheet Insulation Used as a Thermal and Sound Adsorbing Liner for Duct Systems".
- 4. Materials 2" thickness and below, shall have a flame spread index of less than 25 and a smoke developed index of less than 50 when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive and all materials shall pass simulated end-use fire tests.
- 5. AP Armaflex and AP Armaflex SA materials shall have a maximum thermal conductivity of 0.25 Btu-in/h-ft2 °F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
- 6. AP Armaflex and AP Armaflex SA materials shall have a maximum water vapor transmission of 0.05 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
- 7. Materials shall have a maximum water absorption rate of 0.2% (%by volume), when tested in accordance with ASTM C 209.
- 8. The material shall be manufactured under an independent third party supervision testing program covering the properties for fire performance, thermal conductivity and water vapor transmission.
- 9. Materials must be approved for air plenums.
- 10. Materials must meet NFPA 90A, NFPA 908 and UL 181 Class 1 specification.
- 11. Materials must meet ASTM C 411. Materials to perform up to 250 degrees F.
- 12. NRC rating 0.40 Test Method ASTM C 423 with ASTM E 795 Type A Mounting. All product except AP Coilflex. NRC rating on the AP Coilflex is 0.60 Test Method ASTM C 423 with ASTM E 795 Type A Mounting.
- E. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- F. Liner Fasteners: Galvanized steel, self-adhesive pad, impact applied, or welded with integral or press-on head.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that ducts have been tested before applying insulation materials.
  - B. Verify that surfaces are clean, foreign material removed, and dry.
- 3.2 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Insulated ducts:
    - 1. Provide insulation with vapor barrier jackets.
    - 2. Finish with tape and vapor barrier jacket.
    - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
    - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
  - C. External Duct Insulation Application:
    - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
    - 2. Secure insulation without vapor barrier with staples, tape, or wires.
    - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
    - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
    - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
  - D. Duct and Plenum Liner Application:
    - 1. Install in accordance with manufacturer's installation instructions.

- 2. Armaflex Sheet Insulation shall be adhered directly to clean. oil-free surfaces with a full cover age of Armaflex 520, 520 Black or Low VOC Spray Adhesive. Apply 520, 520 Black and Spray Adhesive to both the Armaflex surface and sheet metal.
- 3. SA Armaflex sheet shall be applied directly to a clean, dry, oil-free surface.
- 4. Ambient temperature for applications is between 40 degrees F and 100 degrees F.
- 5. The skin side (smooth side) shall be exposed to the air stream.
- 6. Butt-edge seams shall be adhered using Armaflex 520,or 520 Black Adhesive by the compression fit method to allow for expansion/contraction. Leave a 1/2" wide uncoated border at the butt edge seams on the duct surface and the insulation surface. Overlap the insulation 1/4" at the butt-edges and compress the edges into place. Apply Armaflex 520 or 520 Black. Allow 48 hours for full cure prior to operating system.
- 7. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

## 3.3 SCHEDULES

- A. Supply ducts from air conditioning units: Flexible glass fiber duct insulation, 1-1/2" thick.
  1. Omit duct wrap where duct liner is indicated.
- B. Transfer ducts between occupied spaces: Duct Liner, 1/2" thick.
- C. Exhaust ducts within 15' of exterior penetration: Flexible glass fiber duct insulation, 1-1/2" thick.
- D. Supply, return and exhaust ducts within 10' of air handling equipment: Duct Liner, 1/2" thick.
- E. Ducts in attic spaces: 3" fiberglass duct insulation.

END OF SECTION 23 07 13

# SECTION 23 07 19 HVAC PIPING INSULATION

#### PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.
- C. Engineered wall outlet seals and refrigerant piping insulation protection.
- 1.2 RELATED REQUIREMENTS
  - A. Section 23 21 13 Hydronic Piping: Placement of hangers and hanger inserts.
  - B. Section 23 23 00 Refrigerant Piping: Placement of inserts.

## 1.3 REFERENCE STANDARDS

- A. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- D. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- E. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- F. ASTM C449 Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- G. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- H. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation; 2017.
- I. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- J. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- K. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- L. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

## 1.4 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Samples: Submit two samples of any representative size illustrating each insulation type.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

## 1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

## PART 2 PRODUCTS

- 2.1 REGULATORY REQUIREMENTS
  - A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- 2.2 GLASS FIBER
  - A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
    - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
    - 2. Maximum Service Temperature: 850 degrees F.
    - 3. Maximum Moisture Absorption: 0.2 percent by volume.
  - B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
  - C. Vapor Barrier Lap Adhesive: Compatible with insulation.
  - D. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
  - E. Fibrous Glass Fabric:
    - 1. Cloth: Untreated; 9 oz/sq yd weight.
    - 2. Blanket: 1.0 lb/cu ft density.
    - 3. Weave: 5x5.
  - F. Indoor Vapor Barrier Finish:
    - 1. Cloth: Untreated; 9 oz/sq yd weight.
    - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
  - G. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
  - H. Insulating Cement: ASTM C449.

## 2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
  - 1. Minimum Service Temperature: Minus 40 degrees F.
  - 2. Maximum Service Temperature: 220 degrees F.
  - 3. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

## 2.4 JACKETS

A. PVC Plastic.

1.

- Jacket: One piece molded type fitting covers and sheet material, off-white color.
  - a. Minimum Service Temperature: 0 degrees F.
  - b. Maximum Service Temperature: 150 degrees F.
  - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
  - d. Thickness: 10 mil.
  - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

- C. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
  - 1. Thickness: 0.010 inch.
  - 2. Finish: Smooth.
  - 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
- 2.5 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION
  - A. Manufacturers:
    - 1. Airex Manufacturing, Inc: www.airexmfg.com/#sle.
  - B. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
    - 1. Outlet Cover Color: Gray.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that piping has been tested before applying insulation materials.
  - B. Verify that surfaces are clean and dry, with foreign material removed.
- 3.2 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Install in accordance with NAIMA National Insulation Standards.
  - C. Exposed Piping: Locate insulation and cover seams in least visible locations.
  - D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
  - E. Glass fiber insulated pipes conveying fluids above ambient temperature.
    - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
    - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
  - F. Inserts and Shields:
    - 1. Application: Piping 2-1/2 inches diameter or larger.
    - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
    - 3. Insert location: Between support shield and piping and under the finish jacket.
    - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
    - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
  - G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section "Firestopping".
  - H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10' above finished floor): Finish with PVC jacket and fitting covers.
  - I. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum or PVC jacket with seams located on bottom side of horizontal piping.

# 3.3 SCHEDULE

- A. Cooling Systems:
  - 1. Condensate Drains from Cooling Coils: 1/2" glass fiber or flexible elastomeric
  - 2. Refrigerant Suction: 1/2" elastomeric

# END OF SECTION 23 07 19

#### SECTION 23 21 00

## GENERAL REQUIREMENTS FOR HVAC PIPING

#### 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. Sleeves.
    - 2. Escutcheons.

## PART 2 - PRODUCTS

## 2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inchminimum thickness; round tube closed with welded longitudinal joint.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

# 2.2 ESCUTCHEONS

- A. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- B. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed or exposed-rivet hinge, and spring-clip fasteners.

## PART 3 - EXECUTION

3.

## 3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
  - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
  - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
  - 2. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
    - Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
  - 2. Install sleeves that are large enough to provide 1/4-inchannular clear space between sleeve and pipe or pipe insulation.

- 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in other sections.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in other sections.
- 3.2 ESCUTCHEON INSTALLATION
  - A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
  - B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
    - 1. Escutcheon Schedule:
      - a. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.
      - b. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.

END OF SECTION 23 21 00

# SECTION 23 23 00 REFRIGERANT PIPING

PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Filter-driers.
- H. Engineered wall seals and insulation protection.
- 1.2 RELATED REQUIREMENTS

## 1.3 REFERENCE STANDARDS

- A. AHRI 710 Performance Rating of Liquid-Line Driers; 2009.
- B. ASHRAE Std 15 Safety Standard for Refrigeration Systems; 2016, with Addendum (2017).
- C. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- D. ASME B31.5 Refrigeration Piping and Heat Transfer Components; 2016.
- E. ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2016.
- F. AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).
- G. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

## 1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- D. Strainers:
  - 1. Use line size strainer upstream of each automatic valve.
- E. Filter-Driers:
  - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

## 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver and store piping and specialties in shipping containers with labeling in place.
  - B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
  - C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

## PART 2 PRODUCTS

- 2.1 PIPING
  - A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
    - 1. Fittings: ASME B16.22 wrought copper.
    - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
  - B. Pipe Supports and Anchors:
    - 1. Provide hangers and supports that comply with MSS SP-58.
      - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
    - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
    - 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
    - 4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
    - 5. Vertical Support: Steel riser clamp.
    - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
    - 7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
    - 8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## 2.2 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

## 2.3 VALVES

- A. Diaphragm Packless Valves:
  - 1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- B. Packed Angle Valves:
  - 1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- C. Ball Valves:
  - 1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.
- D. Service Valves:
  - 1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

## 2.4 STRAINERS

- A. Straight Line or Angle Line Type:
  - 1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

## 2.5 CHECK VALVES

- A. Straight Through Type:
  - 1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 degrees F.

## 2.6 FILTER-DRIERS

- A. Performance:
  - 1. Flow Capacity Liquid Line: \_\_\_\_\_ ton, minimum, rated in accordance with AHRI 710.
  - 2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
  - 3. Design Working Pressure: 350 psi, minimum.
- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
  - 1. Connections: As specified for applicable pipe type.
- 2.7 ENGINEERED WALL SEALS AND INSULATION PROTECTION
  - A. Manufacturers:
    - 1. Airex Manufacturing, Inc:
  - B. Basis of Design: Airex Manufacturing, Inc1. Pipe Penetration Wall Seal: Airex Titan Outlet.
  - C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
    - 1. Outlet Cover Color: Gray.

## PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.5.
  - 2. Support horizontal piping as indicated.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 6. Provide copper plated hangers and supports for copper piping.
- F. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access to concealed valves and fittings.
- I. Flood piping system with nitrogen when brazing.
- J. Insulate piping and equipment; refer to Section23 07 19.
- K. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- L. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- M. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- N. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- O. Fully charge completed system with refrigerant after testing.

P. Provide pipe penetration seal system where piping penetrates exterior walls.

# 3.2 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
  - 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.

# END OF SECTION 23 23 00

# SECTION 23 31 00 HVAC DUCTS AND CASINGS

#### PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Nonmetal ductwork.

## 1.2 RELATED REQUIREMENTS

- A. Section 23 07 13 Duct Insulation: External insulation and duct liner.
- B. Section 23 33 00 Air Duct Accessories.
- C. Section 23 36 00 Air Terminal Units.
- D. Section 23 37 00 Air Outlets and Inlets.
- E. Section 23 05 93 Testing, Adjusting, and Balancing for HVAC.

## 1.3 REFERENCE STANDARDS

- A. ASHRAE (FUND) ASHRAE Handbook Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A240/A240M Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.
- D. ASTM A480/A480M Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2017.
- E. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- F. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- G. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- H. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- I. ICC-ES AC01 Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- J. ICC-ES AC106 Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
- K. ICC-ES AC193 Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- L. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
- M. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- N. NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2017.
- O. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- P. SMACNA (KVS) Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
- Q. SMACNA (LEAK) HVAC Air Duct Leakage Test Manual; 2012.
- 1.4 PERFORMANCE REQUIREMENTS
  - A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.
- 1.5 SUBMITTALS
  - A. See Division 1 Section Administrative Requirements, for submittal procedures.

- B. Product Data: Provide data for duct materials.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

#### 1.6 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

## PART 2 PRODUCTS

- 2.1 DUCT ASSEMBLIES
  - A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.

## 2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Stainless Steel for Ducts: ASTM A 240/A 240M, Type 304.
- D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
  - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
  - 2. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
  - 3. For Use With Flexible Ducts: UL labeled.
- E. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- F. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
- G. Insulated Flexible Ducts:
  - 1. Two ply vinyl film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
    - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
    - b. Maximum Velocity: 4000 fpm.
    - c. Temperature Range: -10 degrees F to 160 degrees F.
- H. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

# 2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide air foil turning vanes when rectangular elbows must be used.

- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- H. Provide high efficiency 45 degree wye takeoffs for all branch ducts in medium and low pressure systems.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

#### 2.4 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Spiral Ducts: Machine made from round spiral lockseam duct, steel with paintlock finish.
  - Manufacturers:
  - a. Wesco

1.

1.

- b. Wichita Sheetmetal
- c. Substitute approved by Engineer.
- C. Double Wall Insulated Spiral Ducts: Machine made from round spiral lockseam duct, steel outer wall with paintlock finish, 1 inch thick fiberglass insulation, perforated galvanized steel inner wall; fittings manufactured with solid inner wall.
  - Manufacturers:
  - a. Wesco
  - b. Wichita Sheetmetal
  - c. Substitute approved by Engineer.
- D. Phenolic Ducts: Rigid thermoset phenolic resin, with 1 mil aluminum foil dual-facing. Reinforced with a 0.2 inch glass scrim.
  - 1. Panel Wall Thickness: Minimum 0.875 inch.
  - 2. Finish: UV resistant glass reinforced polyester/epoxy (GRP/GRE) cladding system.
  - 3. Manufacturers:
    - a. Kingspan Insulation LLC; The Kingspan KoolDuct System: www.kingspaninsulation.us/#sle.
- E. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
  - 1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
  - 2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
  - 3. Maximum Velocity: 4000 fpm.
  - 4. Temperature Range: Minus 10 degrees F to 160 degrees F.
- F. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

## PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards -Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or

screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Connect flexible ducts to metal ducts with draw bands and sealant plus sheet metal screws. Use a maximum of 5' of flexible duct, at final connection to diffusers only, free of kinks. Do not install above inaccessible ceilings. Do not use flexible ductwork in exposed areas.
- K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- L. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- M. Exposed spiral ductwork shall be supported from top chord of structural members, utilizing steel cable hangers and adjustable cable clamps.

## 3.2 SCHEDULES

- A. Ductwork Material:
  - 1. Low Pressure Supply: Steel.
  - 2. Return and Relief: Steel.
  - 3. General Exhaust: Steel.
  - 4. Outside Air Intake: Steel.
  - 5. At contractor's option, phenolic ductwork may be used for supply and return ductwork in medium and low pressure systems.
- B. Ductwork Pressure Class:
  - 1. Supply, Return and Relief: 1 inch.
  - 2. General Exhaust: 1/2 inch.
- C. Round ductwork shall be double wall spiral where exposed. Concealed round ductwork may be spiral, double or single wall, or fabricated.

## END OF SECTION 23 31 00

# SECTION 23 33 00 AIR DUCT ACCESSORIES

PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers.
- C. Combination fire and smoke dampers.
- D. Duct access doors.
- E. Duct test holes.
- F. Flexible duct connections.
- G. Volume control dampers.
- 1.2 RELATED REQUIREMENTS
  - A. Section 23 31 00 HVAC Ducts and Casings.
- 1.3 REFERENCE STANDARDS
  - A. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
  - B. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
  - C. UL 33 Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
  - D. UL 555 Standard for Fire Dampers; Current Edition, Including All Revisions.
  - E. UL 555S Standard for Smoke Dampers; Current Edition, Including All Revisions.

## 1.4 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- E. Project Record Drawings: Record actual locations of access doors and test holes.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Protect dampers from damage to operating linkages and blades.
- PART 2 PRODUCTS

## 2.1 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.
- 2.2 BACKDRAFT DAMPERS
  - A. Gravity Backdraft Dampers, Size 24 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- 2.3 COMBINATION FIRE AND SMOKE DAMPERS
  - A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
  - B. Provide factory sleeve and collar for each damper.
  - C. Multiple Blade Dampers: Fabricate with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

D. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Locate damper operator on exterior of duct and link to damper operating shaft.

#### 2.4 DUCT ACCESS DOORS

- A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
  - 1. Less Than 12 inches Square: Secure with sash locks.
  - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
  - 3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
  - 4. Larger Sizes: Provide an additional hinge.

#### 2.5 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

#### 2.6 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
    - a. Net Fabric Width: Approximately 2 inches wide.
  - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.
- C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

## 2.7 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
- B. Splitter Dampers:
  - 1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
  - 2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
  - 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw .
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Quadrants:
  - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
- G. Remote Operators:
  - 1. Where dampers are installed above inaccessible ceilings, provide remote operator assembly, consisting of worm gear operated self locking regulator, screwdriver operated flexible shaft and couplings, and ceiling termination bracket with 1" diamter access cap with white finish.

## PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide fire dampers and combination fire and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- G. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- H. Provide balancing dampers where indicated on drawings.
- I. Where dampers are installed above inaccessible ceilings, provide remote damper operator.
- J. Provide balancing dampers on low pressure duct take-offs to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Dampers may not be shown on drawings, but shall be provided regardless. Omit dampers only where noted on drawings. Dampers are to be located as close to main as possible while remaining accessible.

## END OF SECTION 23 33 00

# SECTION 23 34 23 POWER VENTILATORS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Ceiling exhaust fans.
- 1.2 REFERENCE STANDARDS
  - A. AMCA (DIR) (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
  - B. AMCA 99 Standards Handbook; 2016.
  - C. AMCA 204 Balance Quality and Vibration Levels for Fans; 2005.
  - D. AMCA 210 Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
  - E. AMCA 300 Reverberant Room Method for Sound Testing of Fans; 2014.
  - F. AMCA 301 Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
  - G. NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2017.
  - H. UL 705 Power Ventilators; Current Edition, Including All Revisions.
  - I. UL 762 Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.
- 1.3 SUBMITTALS
  - A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
  - B. Manufacturer's Instructions: Indicate installation instructions.
  - C. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

## 1.5 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

# PART 2 PRODUCTS

- 2.1 POWER VENTILATORS GENERAL
  - A. Static and Dynamically Balanced: AMCA 204 Balance Quality and Vibration Levels for Fans.
  - B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
  - C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
  - D. Fabrication: Conform to AMCA 99.
  - E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
  - F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
  - G. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.
- 2.2 CABINET AND CEILING EXHAUST FANS
  - A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

- B. Disconnect Switch: Cord and plug in housing for thermal overload protected motor.
- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

## PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
  - 1. Install fans with resilient mountings and flexible electrical leads. Refer to Section 23 05 48.
  - 2. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.
- D. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION 23 34 23

# SECTION 23 37 00 AIR OUTLETS AND INLETS

#### PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Diffusers.
  - B. Registers/grilles.
- 1.2 REFERENCE STANDARDS
  - A. ASHRAE Std 70 Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2011).

## 1.3 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- 1.4 QUALITY ASSURANCE
  - A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Carnes Company HVAC: www.carnes.com.
  - B. Krueger: www.krueger-hvac.com/#sle.
  - C. Price Industries: www.price-hvac.com/#sle.
  - D. Titus: www.titus-hvac.com/#sle.
- 2.2 DIFFUSERS, REGISTERS, AND GRILLES
  - A. Type and performance are scheduled on the drawings.
  - B. Coordinate finish of all devices with Architect.

## PART 3 EXECUTION

- 3.1 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
  - C. Install diffusers to ductwork with air tight connection.
  - D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
  - E. Paint ductwork visible behind air outlets and inlets matte black. Coordinate with G.C.
- 3.2 SCHEDULES
  - A. On Drawings.

## END OF SECTION 23 37 00

# SECTION 23 40 00 HVAC AIR CLEANING DEVICES

#### PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Disposable, extended area panel filters.
  - B. Filter frames.
- 1.2 REFERENCE STANDARDS
  - A. ASHRAE Std 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017.
  - B. UL 900 Standard for Air Filter Units; Current Edition, Including All Revisions.
- 1.3 EXTRA MATERIALS
  - A. Provide one set of disposable panel filters. Filters shall be delivered to Owner.

PART 2 PRODUCTS

## 2.1 FILTER MANUFACTURERS

- A. American Filtration Inc: www.americanfiltration.com/#sle.
- B. AAF International/American Air Filter: www.aafintl.com/#sle.
- C. Camfil Farr Company: www.camfilfarr.com/#sle.

## 2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
  - 1. Frame: Non-flammable.
  - 2. Nominal thickness: 2 inches.
- B. Minimum Efficiency Reporting Value (MERV): 8, when tested in accordance with ASHRAE 52.2.
- 2.3 FILTER FRAMES AND HOUSINGS
  - A. General: Fabricate filter frames and supporting structures of 16 gage, 0.0598 inch galvanized steel or extruded aluminum T-section construction with necessary gasketing between frames and walls.

## PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Install filter gage static pressure tips upstream and downstream of high efficiency filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.
- D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
- E. Ensure that filters are easily removable from equipment, and that access is not blocked by other installations.

## END OF SECTION 23 40 00

# SECTION 23 81 26.13 SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Forced air furnaces.
- B. Air cooled condensing units.
- C. Indoor air handling (fan and coil) units for ductless systems.
- D. Controls.

## 1.2 REFERENCE STANDARDS

- A. AHRI 210/240 Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 520 Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 15 Safety Standard for Refrigeration Systems; 2016, with Addendum (2017).
- D. ASHRAE Std 23.1 Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; 2010.
- E. NFPA 54 National Fuel Gas Code; 2018.
- F. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- G. NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2018.
- H. NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2019.
- I. UL 207 Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

# 1.3 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

# 1.4 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

# PART 2 PRODUCTS

# 2.1 SYSTEM DESIGN

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
  - 1. Heating: Natural gas fired.
  - 2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.
  - 3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawings for additional requirements.

## 2.2 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
- B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
  - 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
  - 2. Manufacturer: System manufacturer.
- C. Remote Actuators:

## 2.3 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
  - 1. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- C. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
  - 1. Provide thermostatic expansion valves.
- D. Operating Controls:
  - 1. Control by room thermostat to maintain room temperature setting.

## 2.4 GAS FURNACE COMPONENTS

- A. Burner: Atmospheric type with adjustable combustion air supply,
  - 1. Electronic pilot ignition, with electric spark igniter.
  - 2. Combustion air damper with synchronous spring return damper motor.
  - 3. Non-corrosive combustion air blower with permanently lubricated motor.
- B. Burner Safety Controls:
  - 1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
  - 2. Flame Rollout Switch: Installed on burner box and prevents operation.
  - 3. Vent Safety Shutoff Sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
  - 4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- C. Operating Controls:
  - 1. Cycle burner by room thermostat to maintain room temperature setting.
  - 2. Supply fan energized from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.
- D. Flue Termination: Concentric roof kit.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
  - B. Verify that proper power supply is available and in correct location.

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.

- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.
- E. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION 23 81 26.13
# SECTION 23 82 00 CONVECTION HEATING AND COOLING UNITS

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Electric cabinet unit heaters.
- 1.2 RELATED REQUIREMENTS
  - A. Section 26 27 17 Equipment Wiring: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.
- 1.3 REFERENCE STANDARDS
- 1.4 SUBMITTALS
  - A. Product Data: Provide typical catalog of information including arrangements.
  - B. Shop Drawings:
    - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
    - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

### PART 2 PRODUCTS

# 2.1 ELECTRIC UNIT HEATERS

- A. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- B. Assembly: Suitable for mounting from ceiling or structure above with built-in controls, thermal safety cut-out, and electric terminal box.
- C. Acceptable Heating Element Assemblies:
  - 1. Horizontal Projection Units:
    - a. Steel fins copper brazed to steel sheath and epoxy sealed for moisture resistance.
    - b. Nickel chromium resistance wire surrounded with magnesium oxide and sheathed in steel, spiral-finned tubes.
    - c. High-mass, all steel tubular type, copper brazed, centrally located and installed in fixed element banks.
- D. Housing:
  - 1. Horizontal Projection Units:
    - a. Construction materials to consist of heavy gage steel with galvanized, polyester powder coat, or high gloss baked enamel finish.
    - b. Provisions for access to internal components for maintenance, adjustments, and repair.
- E. Air Inlets and Outlets:
  - 1. Inlets: Provide stamped louvers or protective grilles with fan blade guard.
  - 2. Outlets: Provide diffuser cones, directional louvers, or radial diffusers.
- F. Fan: Factory balanced, direct drive, axial type with fan guard.
- G. Motor: Totally enclosed, thermally protected, and provided with permanently lubricated bearings.
- H. Controls:
  - 1. Disconnect.
  - 2. Built-in thermostat.

### 2.2 ELECTRIC CABINET UNIT HEATERS

- A. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- B. Heating Elements: Provide open-wire, finned tubular, or resistance wire enclosed in steel sheath.

- C. Cabinet: Minimum 18 gage, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
- D. Finish:
  - 1. Factory applied, painted finish.
  - 2. Color: As selected from color chart.
- E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- F. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
- G. Controls:
  - 1. Fan speed switch.
  - 2. Thermostat.
- H. Filter: Easily removed, 1 inch thick glass fiber throw-away type, located to filter air before coil.

- 3.1 EXAMINATION
  - A. Verify that surfaces are suitable for installation.
  - B. Verify that field measurements are as indicated on drawings.
- 3.2 INSTALLATION
  - A. Install in accordance with manufacturer's recommendations.
  - B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
  - C. Do not damage equipment or finishes.
  - D. Unit Heaters:
    - 1. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
  - E. Cabinet Unit Heaters:
    - 1. Install as indicated.
    - 2. Coordinate to ensure correct recess size for recessed units.
  - F. Units with Electric Heating Elements:
    - 1. Install as indicated including electrical devices furnished by manufacturer but not factory installed.
    - 2. Install wiring in accordance with the manufacturer's wiring diagram submittal and Section 26 27 17.
- 3.3 CLEANING
  - A. After construction and painting is completed, clean exposed surfaces of units.
  - B. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

#### END OF SECTION 23 82 00

# SECTION 26 05 01 ELECTRICAL DEMOLITION

#### PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Electrical demolition.

# PART 2 PRODUCTS (N/A)

### PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation.
- D. Report discrepancies to Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

# 3.2 PREPARATION

- A. Disconnect and remove electrical systems where required.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

# 3.3 DEMOLITION OF ELECTRICAL WORK

- A. Remove existing electrical installations throughout the project areas as required for new work.
- B. Remove abandoned equipment, conduit, and wiring.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- F. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- G. Repair adjacent construction and finishes damaged during demolition.
- H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

### 3.4 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

# END OF SECTION 26 05 01

### SECTION 26 05 19

### LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Oxide inhibiting compound.
- F. Wire pulling lubricant.
- G. Cable ties.

# 1.2 RELATED REQUIREMENTS

- A. Section 07 84 00 Firestopping.
- B. Section 26 05 26 Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 05 36 Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.
- D. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.

# 1.3 REFERENCE STANDARDS

- A. ASTM B3 Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM B800 Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes -Annealed and Intermediate Tempers; 2005 (Reapproved 2015).
- F. ASTM B801 Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation; 2016.
- G. ASTM D3005 Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- H. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- I. NECA 104 Recommended Practice for Installing Aluminum Building Wire and Cable; 2012.
- J. NECA 120 Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- K. NEMA WC 70 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- L. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 44 Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- N. UL 83 Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- O. UL 486A-486B Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486C Splicing Wire Connectors; Current Edition, Including All Revisions.
- Q. UL 486D Sealed Wire Connector Systems; Current Edition, Including All Revisions.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

- R. UL 510 Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- S. UL 1569 Metal-Clad Cables; Current Edition, Including All Revisions.

# 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

# 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- 1.6 FIELD CONDITIONS
  - A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

### PART 2 PRODUCTS

- 2.1 CONDUCTOR AND CABLE APPLICATIONS
  - A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
  - B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
  - C. Nonmetallic-sheathed cable is not permitted.
  - D. Underground feeder and branch-circuit cable is not permitted.
  - E. Service entrance cable is not permitted.
  - F. Armored cable is not permitted.
  - G. Metal-clad cable is permitted only as follows:
    - 1. Where not otherwise restricted, may be used:
      - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
        - 1) Maximum Length: 6 feet.

### 2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:

- 1. Provide copper conductors except where aluminum conductors are specifically indicated as permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
- 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
- 3. Tinned Copper Conductors: Comply with ASTM B33.
- 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- H. Minimum Conductor Size:
  - 1. Branch Circuits: 12 AWG.
- I. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
  - 3. Color Code:
    - a. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.

# 2.3 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

### 2.4 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

### 2.5 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

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- C. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- D. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- F. Mechanical Connectors: Provide bolted type or set-screw type.
- G. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- 2.6 WIRING ACCESSORIES
  - A. Electrical Tape:
    - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
    - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
  - B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
  - C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
  - D. Cable Ties: Material and tensile strength rating suitable for application.

#### 3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Circuiting Requirements:
  - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
  - 2. When circuit destination is indicated without specific routing, determine exact routing required.
  - 3. Arrange circuiting to minimize splices.
  - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
  - 5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
  - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  - 2. Pull all conductors and cables together into raceway at same time.

- 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
- 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- I. Terminate cables using suitable fittings.
  - Metal-Clad Cable (Type MC):
  - a. Use listed fittings.

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- b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- J. Install conductors with a minimum of 12 inches of slack at each outlet.
- K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- M. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  - 3. Do not remove conductor strands to facilitate insertion into connector.
  - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
  - 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
  - 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- O. Insulate ends of spare conductors using vinyl insulating electrical tape.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION 26 05 19

# SECTION 26 05 26

# GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 36 Cable Trays for Electrical Systems: Additional grounding and bonding requirements for cable tray systems.
- C. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.

# 1.3 REFERENCE STANDARDS

- A. IEEE 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- D. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 Grounding and Bonding Equipment; Current Edition, Including All Revisions.

# 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Verify exact locations of underground metal water service pipe entrances to building.
  - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
  - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.
- 1.5 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements for submittals procedures.
  - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
  - C. Field quality control test reports.
  - D. Project Record Documents: Record actual locations of grounding electrode system components and connections.
- 1.6 QUALITY ASSURANCE
  - A. Conform to requirements of NFPA 70.
  - B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
  - C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

# 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

# PART 2 PRODUCTS

- 2.1 GROUNDING AND BONDING REQUIREMENTS
  - A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
  - B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
  - D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - E. Grounding System Resistance:
    - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
    - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
  - F. Grounding Electrode System:
    - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      - a. Provide continuous grounding electrode conductors without splice or joint.
      - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
    - 2. Metal Underground Water Pipe(s):
      - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
    - 3. Metal Building or Structure Frame:
      - a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
    - 4. Concrete-Encased Electrode:
      - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
    - 5. Ground Rod Electrode(s):
      - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
      - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
      - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
    - 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

- Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
- G. Separately Derived System Grounding:

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- Separately derived systems include, but are not limited to:
  - a. Transformers (except autotransformers such as buck-boost transformers).
- b. Generators, when neutral is switched in the transfer switch.
- 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
- 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
- 4. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
- 5. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- H. Bonding and Equipment Grounding:
  - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  - 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
  - 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    - b. Metal gas piping.
  - 8. Provide bonding for metal building frame.
- I. Cable Tray Systems: Also comply with Section 26 05 36.

### 2.2 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
  - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
  - 1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
      - 2) Use bare copper conductors where directly encased in concrete (not in raceway).

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- C. Connectors for Grounding and Bonding:
  - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
  - 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  - 2. Size: As indicated.
  - 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
  - 1. Comply with NEMA GR 1.
  - 2. Material: Copper-bonded (copper-clad) steel.
  - 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

- 3.1 EXAMINATION
  - A. Verify that work likely to damage grounding and bonding system components has been completed.
  - B. Verify that field measurements are as shown on the drawings.
  - C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
  - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

#### 3.3 FIELD QUALITY CONTROL

- A. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- B. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- C. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL

### SECTION 26 05 29

### HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

# 1.2 RELATED REQUIREMENTS

- A. Section 26 05 34 Conduit: Additional support and attachment requirements for conduits.
- B. Section 26 05 36 Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- C. Section 26 05 37 Boxes: Additional support and attachment requirements for boxes.
- D. Section 26 51 00 Interior Lighting: Additional support and attachment requirements for interior luminaires.

# 1.3 REFERENCE STANDARDS

- A. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 Metal Framing Standards Publication; 2004.
- E. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
  - A. Coordination:
    - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
    - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
    - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
    - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
    - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- 1.5 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- 1.6 QUALITY ASSURANCE
  - A. Comply with NFPA 70.
  - B. Comply with applicable building code.
- PART 2 PRODUCTS

# 2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

- 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
- 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
- 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- Steel Components: Use corrosion resistant materials suitable for the environment where installed.
   a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
  - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
  - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 1. Comply with MFMA-4.
  - 2. Channel Material:
    - a. Indoor Dry Locations: Use painted steel or zinc-plated steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
  - Minimum Size, Unless Otherwise Indicated or Required:
  - a. Equipment Supports: 1/2 inch diameter.
  - b. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch diameter.
  - c. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch diameter.
  - d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
  - e. Outlet Boxes: 1/4 inch diameter.
  - f. Luminaires: 1/4 inch diameter.
- F. Anchors and Fasteners:

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- 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- 4. Hollow Masonry: Use toggle bolts.
- 5. Hollow Stud Walls: Use toggle bolts.
- 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
- 7. Sheet Metal: Use sheet metal screws.
- 8. Plastic and lead anchors are not permitted.
- 9. Powder-actuated fasteners are not permitted.
- 10. Hammer-driven anchors and fasteners are not permitted.
- 11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
  - a. Comply with MFMA-4.
  - b. Channel Material: Use galvanized steel.
  - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

- 3.1 EXAMINATION
  - A. Verify that field measurements are as shown on the drawings.
  - B. Verify that mounting surfaces are ready to receive support and attachment components.
  - C. Verify that conditions are satisfactory for installation prior to starting work.

# 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
  - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 26 05 34.
- I. Box Support and Attachment: Also comply with Section 26 05 37.
- J. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00.
- K. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- L. Secure fasteners according to manufacturer's recommended torque settings.
- M. Remove temporary supports.
- 3.3 FIELD QUALITY CONTROL
  - A. Inspect support and attachment components for damage and defects.
  - B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
  - C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 05 29

# SECTION 26 05 34 CONDUIT

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Intermediate metal conduit (IMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Conduit fittings.
- H. Accessories.

# 1.2 RELATED REQUIREMENTS

- A. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 26 Grounding and Bonding for Electrical Systems.
  1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 05 29 Hangers and Supports for Electrical Systems.
- D. Section 26 05 37 Boxes.
- E. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 21 00 Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- G. Section 27 10 00 Structured Cabling: Additional requirements for communications systems conduits.

### 1.3 REFERENCE STANDARDS

- A. ANSI C80.1 American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. ANSI C80.6 American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 101 Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NECA 111 Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- G. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- H. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- I. NEMA TC 3 Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.
- J. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 6 Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- M. UL 360 Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- N. UL 514B Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- O. UL 651 Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- P. UL 797 Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

- Q. UL 1242 Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
  - A. Coordination:
    - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
    - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
    - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
    - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
    - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
  - B. Sequencing:
    - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

### 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
  - A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

### PART 2 PRODUCTS

### 2.1 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), or rigid PVC conduit.
  - 3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
  - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
  - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

- 6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection.
- 7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges.
- D. Embedded Within Concrete:
  - 1. Within Slab on Grade: Not permitted.
  - 2. Within Slab Above Ground: Not permitted.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
  - 1. Locations subject to physical damage include, but are not limited to:
    - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
  - 1. Maximum Length: 6 feet.
- N. Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit.
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
  - 3. Maximum Length: 6 feet unless otherwise indicated.
  - Vibrating equipment includes, but is not limited to:
     a. Motors.
- 2.2 CONDUIT REQUIREMENTS
  - A. Electrical Service Conduits: Also comply with Section 26 21 00.
  - B. Communications Systems Conduits: Also comply with Section 27 10 00.
  - C. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.
  - D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
  - E. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - F. Minimum Conduit Size, Unless Otherwise Indicated:
    - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
    - 2. Control Circuits: 1/2 inch (16 mm) trade size.
    - 3. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
    - 4. Underground, Interior: 3/4 inch (21 mm) trade size.
    - 5. Underground, Exterior: 3/4 inch (21 mm) trade size.
  - G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

# 2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

# A. Manufacturers:

- 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
- 2. Republic Conduit: www.republic-conduit.com/#sle.
- 3. Wheatland Tube Company: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

### C. Fittings:

- 1. Manufacturers:
  - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
  - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
  - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.
- 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

# 2.4 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
  - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
  - 2. Republic Conduit: www.republic-conduit.com/#sle.
  - 3. Wheatland Tube Company: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
    - c. Thomas & Betts Corporation: www.tnb.com/#sle.
  - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

### 2.5 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc: www.afcweb.com.
  - 2. Electri-Flex Company: www.electriflex.com.
  - 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

### C. Fittings:

- 1. Manufacturers:
  - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
  - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
  - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.

# 2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

# A. Manufacturers:

- 1. AFC Cable Systems, Inc: www.afcweb.com.
- 2. Electri-Flex Company: www.electriflex.com.
- 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
    - c. Thomas & Betts Corporation: www.tnb.com/#sle.
  - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
- 2.7 ELECTRICAL METALLIC TUBING (EMT)
  - A. Manufacturers:
    - 1. Allied Tube & Conduit: www.alliedeg.com.
    - 2. Republic Conduit: www.republic-conduit.com/#sle.
    - 3. Wheatland Tube Company: www.wheatland.com.
  - B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
  - C. Fittings:
    - 1. Manufacturers:
      - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
      - c. Thomas & Betts Corporation: www.tnb.com/#sle.
    - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
    - 3. Material: Use steel or malleable iron.
    - 4. Connectors and Couplings: Use compression (gland) or set-screw type.
      - a. Do not use indenter type connectors and couplings.

# 2.8 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
  - 1. Cantex Inc: www.cantexinc.com/#sle.
  - 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
- 2.9 ACCESSORIES
  - A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
  - B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

# 3.1 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

# 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Conduit Routing:
  - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
  - 2. When conduit destination is indicated and routing is not shown, determine exact routing required.
  - 3. Conceal all conduits unless specifically indicated to be exposed.
  - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
    - c. Within joists in areas with no ceiling.
  - 5. Unless otherwise approved, do not route conduits exposed:
    - a. Across floors.
    - b. Across roofs.
    - c. Across top of parapet walls.
    - d. Across building exterior surfaces.
  - 6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
  - 7. Arrange conduit to maintain adequate headroom, clearances, and access.
  - 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  - 9. Arrange conduit to provide no more than 150 feet between pull points.
  - 10. Route conduits above water and drain piping where possible.
  - 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
  - 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
  - 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    - a. Heaters.
    - b. Hot water piping.
    - c. Flues.
  - 14. Group parallel conduits in the same area together on a common rack.
- G. Conduit Support:

- 1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
- 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- 4. Use conduit strap to support single surface-mounted conduit.
  - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
- 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
- 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
- 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
- 8. Use of wire for support of conduits is not permitted.
- H. Connections and Terminations:
  - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  - 3. Use suitable adapters where required to transition from one type of conduit to another.
  - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- I. Penetrations:
  - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  - 4. Conceal bends for conduit risers emerging above ground.
  - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  - 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
  - 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  - 8. Provide metal escutcheon plates for conduit penetrations exposed to public view.
  - 9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- J. Underground Installation:
  - 1. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 24 inches.
    - b. Under Slab on Grade: 12 inches to bottom of slab.
  - 2. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.
- K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 03 30 00 with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
  - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  - 2. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
  - 1. Where conduits pass from outdoors into conditioned interior spaces.
  - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
  - 3. Where conduits penetrate coolers or freezers.
- N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- O. Provide grounding and bonding in accordance with Section 26 05 26.
- P. Identify conduits in accordance with Section 26 05 53.
- 3.3 FIELD QUALITY CONTROL
  - A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
  - B. Correct deficiencies and replace damaged or defective conduits.
- 3.4 CLEANING
  - A. Clean interior of conduits to remove moisture and foreign matter.
- 3.5 PROTECTION
  - A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 26 05 34

# SECTION 26 05 37 BOXES

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 Hangers and Supports for Electrical Systems.
- C. Section 26 05 34 Conduit:
  - 1. Conduit bodies and other fittings.
  - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 27 26 Wiring Devices:
  - 1. Wall plates.
  - 2. Floor box service fittings.
  - 3. Additional requirements for locating boxes for wiring devices.
- F. Section 27 10 00 Structured Cabling: Additional requirements for communications systems outlet boxes.

#### 1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 Specification for Underground Enclosure Integrity; 2017.
- H. UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 514A Metallic Outlet Boxes; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
  - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

- 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
- 6. Coordinate the work with other trades to preserve insulation integrity.
- 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
- 8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

### 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, junction and pull boxes, cabinets and enclosures, and floor boxes.
  - 1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- C. Project Record Documents: Record actual locations for pull boxes, cabinets and enclosures, and floor boxes.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. Keys for Lockable Enclosures: Two of each different key.

### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### PART 2 PRODUCTS

### 2.1 BOXES

- A. General Requirements:
  - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
  - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  - 3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
  - 4. Use suitable concrete type boxes where flush-mounted in concrete.
  - 5. Use suitable masonry type boxes where flush-mounted in masonry walls.
  - 6. Use raised covers suitable for the type of wall construction and device configuration where required.
  - 7. Use shallow boxes where required by the type of wall construction.
  - 8. Do not use "through-wall" boxes designed for access from both sides of wall.
  - 9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  - 10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

- 11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
- 12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
- 13. Minimum Box Size, Unless Otherwise Indicated:
  - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
  - b. Communications Systems Outlets: Comply with Section 27 10 00.
  - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
- 14. Wall Plates: Comply with Section 26 27 26.
- 15. Manufacturers:
  - a. Cooper Crouse-Hinds, a division of Eaton Corporation; \_\_\_\_\_: www.cooperindustries.com/#sle.
  - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com.
  - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com.
  - d. Thomas & Betts Corporation: www.tnb.com.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
  - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 1, painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  - Junction and Pull Boxes Larger Than 100 cubic inches:
     a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  - 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    - b. Back Panels: Painted steel, removable.
  - 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
  - 6. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
    - b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com.
    - c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com.

- 3.1 EXAMINATION
  - A. Verify that field measurements are as shown on drawings.
  - B. Verify that mounting surfaces are ready to receive boxes.
  - C. Verify that conditions are satisfactory for installation prior to starting work.
- 3.2 INSTALLATION
  - A. Install products in accordance with manufacturer's instructions.
  - B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
  - C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
  - D. Provide separate boxes for emergency power and normal power systems.
  - E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
  - F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
  - G. Box Locations:

- 1. Locate boxes to be accessible. Provide access panels as required where approved by the Architect.
- 2. Unless dimensioned, box locations indicated are approximate.
- 3. Locate boxes as required for devices installed under other sections or by others.
  - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
  - b. Communications Systems Outlets: Comply with Section 27 10 00.
- 4. Locate boxes so that wall plates do not span different building finishes.
- 5. Locate boxes so that wall plates do not cross masonry joints.
- 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
- 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
- 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
- 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
  - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
  - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
- 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 34.
- 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
  - a. Concealed above accessible suspended ceilings.
  - b. Within joists in areas with no ceiling.
  - c. Electrical rooms.
  - d. Mechanical equipment rooms.
- H. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
  - 4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
  - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

- N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- O. Close unused box openings.
- P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- Q. Provide grounding and bonding in accordance with Section 26 05 26.
- R. Identify boxes in accordance with Section 26 05 53.

#### 3.3 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### 3.4 **PROTECTION**

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

# END OF SECTION 26 05 37

# SECTION 26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Floor marking tape.
- G. Warning signs and labels.

# 1.2 RELATED REQUIREMENTS

- A. Section 09 91 13 Exterior Painting.
- B. Section 09 91 23 Interior Painting.
- C. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 05 36 Cable Trays for Electrical Systems: Additional identification requirements for cable tray systems.
- E. Section 27 10 00 Structured Cabling: Identification for communications cabling and devices.

# 1.3 REFERENCE STANDARDS

- A. ANSI Z535.2 American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 Marking and Labeling Systems; Current Edition, Including All Revisions.

# 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
  - 2. Do not install identification products until final surface finishes and painting are complete.
- 1.5 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements for submittals procedures.
  - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- 1.6 QUALITY ASSURANCE
  - A. Conform to requirements of NFPA 70.
- 1.7 FIELD CONDITIONS
  - A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.
- PART 2 PRODUCTS
- 2.1 IDENTIFICATION REQUIREMENTS
  - A. Identification for Equipment:

- 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
  - a. Panelboards:
    - 1) Identify ampere rating.
    - 2) Identify voltage and phase.
    - 3) Identify power source and circuit number. Include location when not within sight of equipment.
    - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
    - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
    - 6) For power panelboards, use identification nameplate to identify load(s) served for each branch device.
  - b. Enclosed switches:
    - 1) Identify voltage and phase.
    - 2) Identify power source and circuit number. Include location when not within sight of equipment.
    - 3) Identify load(s) served. Include location when not within sight of equipment.
  - c. Time Switches:
    - 1) Identify load(s) served and associated circuits controlled. Include location.
  - d. Enclosed Contactors:
    - 1) Identify ampere rating.
    - 2) Identify voltage and phase.
    - 3) Identify coil voltage.
    - 4) Identify load(s) and associated circuits controlled. Include location.
- 2. Service Equipment:
  - a. Use identification nameplate to identify each service disconnecting means.
  - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
- 3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
- 4. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
  - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 91 23 and 09 91 13.
- 5. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- B. Identification for Conductors and Cables:
  - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
  - 2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
  - 3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  - 4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.
    - b. Within boxes when more than one circuit is present.

- 5. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- 6. Use underground warning tape to identify direct buried cables.
- C. Identification for Raceways:
  - 1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
    - a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
      - 1) Color Code:
        - (a) Fire Alarm System: Red.
      - 2) Field-Painting: Comply with Section 09 91 23 and 09 91 13.
      - 3) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.
  - 2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
  - 3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  - 4. Use underground warning tape to identify underground raceways.
- D. Identification for Cable Tray: Comply with Section 26 05 36.
- E. Identification for Boxes:
  - 1. Use voltage markers to identify highest voltage present.
  - 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
    - a. Color-Coded Boxes: Field-painted in accordance with Section 09 91 23 and 09 91 13 per the following color code:.
      - 1) Fire Alarm System: Red.
    - b. For exposed boxes in public areas, do not color code.
  - 3. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
    - a. For exposed boxes in public areas, use only identification labels.
- F. Identification for Devices:
  - 1. Use identification label, engraved wallplate, or handwritten text using indelible marker to identify serving branch circuit for all receptacles.
    - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
  - 2. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
  - 3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
- G. Identification for Luminaires:
  - 1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

### 2.2 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
  - 1. Materials:
    - a. Indoor Clean, Dry Locations: Use plastic nameplates.
    - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
  - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
    - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.

- 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
- 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
- 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
  - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
  - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
  - 1. Minimum Size: 1 inch by 2.5 inches.
  - 2. Legend:
    - a. System designation where applicable:
      - 1) Fire Alarm System: Identify with text "FIRE ALARM".
    - b. Equipment designation or other approved description.
  - 3. Text: All capitalized unless otherwise indicated.
  - 4. Minimum Text Height:
    - a. System Designation: 1 inch.
    - b. Equipment Designation: 1/2 inch.
  - 5. Color:
    - a. Normal Power System: White text on black background.
    - b. Fire Alarm System: White text on red background.
- D. Format for General Information and Operating Instructions:
  - 1. Minimum Size: 1 inch by 2.5 inches.
  - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
  - 3. Text: All capitalized unless otherwise indicated.
  - 4. Minimum Text Height: 1/4 inch.
  - 5. Color: Black text on white background unless otherwise indicated.
- E. Format for Caution and Warning Messages:
  - 1. Minimum Size: 2 inches by 4 inches.
  - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.

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- 3. Text: All capitalized unless otherwise indicated.
- 4. Minimum Text Height: 1/2 inch.
- 5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Control Device Identification:
  - 1. Minimum Size: 3/8 inch by 1.5 inches.
  - 2. Legend: Load controlled or other designation indicated.
  - 3. Text: All capitalized unless otherwise indicated.
  - 4. Minimum Text Height: 3/16 inch.
  - 5. Color: Black text on white background.
- G. Format for Fire Alarm Device Identification:
  - 1. Minimum Size: 3/8 inch by 1.5 inches.
  - 2. Legend: Designation indicated and device zone or address.
  - 3. Text: All capitalized unless otherwise indicated.
  - 4. Minimum Text Height: 3/16 inch.
  - 5. Color: Red text on white background.
### 2.3 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

### 2.4 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
  - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
  - 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
  - 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
  - 1. Markers for Voltage Identification: Highest voltage present.
  - 2. Markers for System Identification:
- E. Color: Black text on orange background unless otherwise indicated.
- 2.5 UNDERGROUND WARNING TAPE
  - A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
  - B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
  - C. Legend: Type of service, continuously repeated over full length of tape.
  - D. Color:
    - 1. Tape for Buried Power Lines: Black text on red background.
    - 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

# 2.6 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

# 2.7 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
  - 1. Materials:
    - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
    - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
  - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
  - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
  - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

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- 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
- 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

# PART 3 EXECUTION

- 3.1 PREPARATION
  - A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- 3.2 INSTALLATION
  - A. Install products in accordance with manufacturer's instructions.
  - B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
    - 1. Surface-Mounted Equipment: Enclosure front.
    - 2. Flush-Mounted Equipment: Enclosure front.
    - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
    - 4. Elevated Equipment: Legible from the floor or working platform.
    - 5. Branch Devices: Adjacent to device.
    - 6. Interior Components: Legible from the point of access.
    - 7. Conduits: Legible from the floor.
    - 8. Boxes: Outside face of cover.
    - 9. Conductors and Cables: Legible from the point of access.
    - 10. Devices: Outside face of cover.
  - C. Install identification products centered, level, and parallel with lines of item being identified.
  - D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
    - 1. Do not use adhesives on exterior surfaces except where substrate can not be penetrated.
  - E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
  - F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
  - G. Secure rigid signs using stainless steel screws.
  - H. Mark all handwritten text, where permitted, to be neat and legible.

### 3.3 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

# SECTION 26 09 23 LIGHTING CONTROL DEVICES

#### PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Occupancy sensors.

# 1.2 RELATED REQUIREMENTS

- A. Section 26 05 29 Hangers and Supports for Electrical Systems.
- B. Section 26 05 37 Boxes.
- C. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 27 26 Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

### 1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
  - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
  - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

### 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- C. Shop Drawings:
  - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.
- E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

# 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### 1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

#### 1.8 WARRANTY

A. Provide five year manufacturer warranty for all occupancy sensors.

### PART 2 PRODUCTS

#### 2.1 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

#### 2.2 OCCUPANCY SENSORS

- A. Manufacturers:
  - 1. Hubbell Incorporated; : www.hubbell.com/#sle.
  - 2. WattStopper; : www.wattstopper.com/#sle.
- B. All Occupancy Sensors:
  - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
- C. Wall Switch Occupancy Sensors:
  - 1. All Wall Switch Occupancy Sensors:
    - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
    - b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
    - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    - e. Finish: Grey. Coverplate to be stainless steel.

### PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that field measurements are as indicated.
  - B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
  - C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
  - D. Verify that final surface finishes are complete, including painting.
  - E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
  - F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
  - G. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of lighting control devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.
- G. Provide required supports in accordance with Section 26 05 29.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- I. Occupancy Sensor Locations:
  - 1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.
- J. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- K. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.
- 3.3 FIELD QUALITY CONTROL
  - A. See Section 01 40 00 Quality Requirements, for additional requirements.
  - B. Inspect each lighting control device for damage and defects.
  - C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
  - D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

# 3.4 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

### 3.5 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### 3.6 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.

- 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
- 4. Location: At project site.

END OF SECTION 26 09 23

# SECTION 26 27 17 EQUIPMENT WIRING

### PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Electrical connections to equipment.

### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 34 Conduit.
- C. Section 26 05 37 Boxes.
- D. Section 26 27 26 Wiring Devices.
- E. Section 26 28 18 Enclosed Switches.

### 1.3 REFERENCE STANDARDS

- A. NEMA WD 1 General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- B. NEMA WD 6 Wiring Devices Dimensional Specifications; 2016.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
  - 2. Determine connection locations and requirements.
- B. Sequencing:
  - 1. Install rough-in of electrical connections before installation of equipment is required.
  - 2. Make electrical connections before required start-up of equipment.

### 1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

# PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Disconnect Switches: As specified in Section 26 28 18 and in individual equipment sections.
- B. Wiring Devices: As specified in Section 26 27 26.
- C. Flexible Conduit: As specified in Section 26 05 34.
- D. Wire and Cable: As specified in Section 26 05 19.
- E. Boxes: As specified in Section 26 05 37.

# PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that equipment is ready for electrical connection, wiring, and energization.
- 3.2 ELECTRICAL CONNECTIONS
  - A. Make electrical connections in accordance with equipment manufacturer's instructions.
  - B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 26 27 17

# SECTION 26 27 26 WIRING DEVICES

PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- B. Section 26 05 37 Boxes.
- C. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 09 23 Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors.
- E. Section 27 10 05 Structured Cabling for Voice and Data Inside-Plant: Voice and data jacks.

### 1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA WD 1 General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- D. NEMA WD 6 Wiring Devices Dimensional Specifications; 2016.
- E. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 20 General-Use Snap Switches; Current Edition, Including All Revisions.
- G. UL 498 Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- H. UL 514D Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- I. UL 943 Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- J. UL 1472 Solid-State Dimming Controls; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
  - A. Coordination:
    - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
    - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
    - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
    - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
    - 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
  - B. Sequencing:
    - 1. Do not install wiring devices until final surface finishes and painting are complete.
- 1.5 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

- 1. Wall Dimmers: Include derating information for ganged multiple devices.
- C. Project Record Documents: Record actual installed locations of wiring devices.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Keys for Locking Switches: Two of each type.
  - 2. Extra Wall Plates: One of each style, size, and finish.

### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

# PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Hubbell Incorporated: www.hubbell-wiring.com.
  - B. Leviton Manufacturing Company, Inc: www.leviton.com.
  - C. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
  - D. Arrow Hart, a brand of Eaton Corp.: www.arrowhart.com.
  - E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

### 2.2 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

# 2.3 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Finished Spaces: Gray with stainless steel wall plate.
- C. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- 2.4 WALL SWITCHES
  - A. Wall Switches General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20; types as indicated on the drawings.
    - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
  - B. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
  - C. Locking Wall Switches: Commercial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

# 2.5 WALL DIMMERS

- A. Wall Dimmers General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- B. Dimmer Type: 4-wire, 0-10V, with integral power pack
- C. Control: Slide control type with separate on/off switch.
- D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:
  1. LED 0-10V: 1200 VA at 120VAC
- E. Wall Dimmers must be compatible with LED drivers provided with luminaires.
- F. Dimmers that require constant voltage are not acceptable.

### 2.6 RECEPTACLES

- A. Receptacles General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
  - Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
  - 3. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
  - 4. Tamper Resistant and Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
  - 1. GFCI Receptacles General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
  - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
  - Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
  - 4. Tamper Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
  - Tamper Resistant and Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

### 2.7 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard.
  - 3. Screws: Metal with slotted heads finished to match wall plate finish.

- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- C. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- D. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

### PART 3 EXECUTION

# 3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### 3.3 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.
- B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of wiring devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switches: 48 inches above finished floor.
    - b. Wall Dimmers: 48 inches above finished floor.
    - c. Receptacles: 18 inches above finished floor or 6 inches above counter.
  - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  - 3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
  - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
  - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- L. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
- M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

### 3.4 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

### 3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust coverplate screws to be uniformly horizontal or vertical.
- C. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

### 3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### END OF SECTION 26 27 26

# SECTION 26 51 00 INTERIOR LIGHTING

PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Ballasts and drivers.
- D. Luminaire accessories.

### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 37 Boxes.
- B. Section 26 05 53 Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 09 23 Lighting Control Devices: Automatic controls for lighting including occupancy sensors.
- D. Section 26 27 26 Wiring Devices: Manual wall switches and wall dimmers.
- E. Section 26 56 00 Exterior Lighting.

### 1.3 REFERENCE STANDARDS

- A. IESNA LM-63 ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- B. IES LM-79 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.
- C. IES LM-80 Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- D. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA/IESNA 500 Standard for Installing Indoor Commercial Lighting Systems; 2006.
- F. NECA/IESNA 502 Standard for Installing Industrial Lighting Systems; 2006.
- G. NEMA LE 4 Recessed Luminaires, Ceiling Compatibility; 2012.
- H. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 924 Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- K. UL 1598 Luminaires; Current Edition, Including All Revisions.
- L. UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
  - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
  - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

### 1.5 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
    - b. Include IES LM-79 test report upon request.
  - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format upon request.
- C. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- D. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

#### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting) and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

### 1.8 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.
- 1.9 WARRANTY
  - A. Provide five year manufacturer warranty for all LED luminaires, including drivers.
  - B. Provide five year pro-rata warranty for batteries for emergency lighting units.
  - C. Provide ten year pro-rata warranty for batteries for self-powered exit signs.

# PART 2 PRODUCTS

- 2.1 LUMINAIRE TYPES
  - A. Furnish products as indicated in luminaire schedule included on the drawings.
- 2.2 LUMINAIRES
  - A. Provide products that comply with requirements of NFPA 70.
  - B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
  - C. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
  - E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
  - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- H. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
- 2.3 EXIT SIGNS
  - A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
    - 1. Number of Faces: Single or double as indicated or as required for the installed location.
    - 2. Directional Arrows: As indicated or as required for the installed location.
  - B. Self-Powered Exit Signs:
    - 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
    - 2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
    - 3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
    - 4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
    - 5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

### 2.4 BALLASTS AND DRIVERS

- A. Ballasts/Drivers General Requirements:
  - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
  - 1. Dimming Range: Continuous dimming from 100 percent to 10 percent relative light output unless dimming capability to lower level is indicated, without flicker.
  - Control Compatibility: Fully compatible with the dimming controls to be installed.
    a. Wall Dimmers: See Section 26 27 26.

### 2.5 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

### PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.
- 3.2 PREPARATION
  - A. Provide extension rings to bring outlet boxes flush with finished surface.
  - B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

#### 3.3 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products according to manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
  - 1. Do not use ceiling tiles to bear weight of luminaires.
  - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
  - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
  - 4. Secure pendant-mounted luminaires to building structure.
  - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
  - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
  - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
  - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
- H. Suspended Luminaires:
  - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
  - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
  - 3. Install canopies tight to mounting surface.
- I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Exit Signs:
  - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

### 3.4 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

# 3.5 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

### 3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

# 3.7 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 51 00

# SECTION 26 56 00 EXTERIOR LIGHTING

#### PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Exterior luminaires.
- 1.2 RELATED REQUIREMENTS
  - A. Section 03 30 00 Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
  - B. Section 26 05 26 Grounding and Bonding for Electrical Systems.
  - C. Section 26 05 37 Boxes.
- 1.3 REFERENCE STANDARDS
  - A. IES LM-79 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
  - B. IES LM-80 Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
  - C. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
  - D. NECA/IESNA 501 Standard for Installing Exterior Lighting Systems; 2006.
  - E. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - F. UL 1598 Luminaires; Current Edition, Including All Revisions.
  - G. UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
  - A. Coordination:
    - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
    - 2. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- 1.5 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
  - B. Shop Drawings:
    - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
    - 2. Provide photometric calculations where luminaires are proposed for substitution.
    - 3. Provide structural calculations for each pole proposed for substitution.
  - C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
    - 1. LED Luminaires:
      - a. Include estimated useful life, calculated based on IES LM-80 test data.

### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

### PART 2 PRODUCTS

# 2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

# 2.2 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

### PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
  - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

- 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- 3.3 FIELD QUALITY CONTROL
  - A. Inspect each product for damage and defects.
  - B. Operate each luminaire after installation and connection to verify proper operation.
  - C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### 3.4 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

# 3.5 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 56 00