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# **Nursing Simulation Lab**

# Building 1 - Columbia Gorge Community College

EDA Award Number 07-79-07767 URI 116720

400 E Scenic Drive The Dalles, Oregon 97058

# PROJECT MANUAL

ISSUE STATUS: 100% CD Set ISSUE DATE: August 28, 2023 RE-ISSUE: December 11, 2023

# Soderstrom Architects

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# COLUMBIA GORGE COMMUNITY COLLEGE

# **Invitation to Bid**

Renovation of the Health and Sciences Simulation Lab

# **Bid Due Date and Time:**

Insert Date and Time

# **Issuing Office:**

Columbia Gorge Community College Name of Contact 400 E Scenic Drive The Dalles, OR, 97058 Phone 541-980-8202 dsaldivar@cgcc.edu

### **Notice of Invitation to Bid**

# Columbia Gorge Community College Invitation to Bid for Renovation of the Health and Sciences Simulation Lab

### **Bids Due on Insert Date at Insert Time**

Columbia Gorge Community College (the "College") is soliciting bids for the renovation of the College's Health and Sciences Simulation Lab. Project components include interior renovations to approximately 2,576 sq. ft. on a single floor of the existing building used for the health sciences programs at the College.

Complete minimum specifications and required bid documents can be obtained from the project contact and <a href="https://www.cgcc.edu/purchasing/bid-announcements">https://www.cgcc.edu/purchasing/bid-announcements</a>. Bids must be delivered to the following office no later than the date and time noted above:

Columbia Gorge Community College Name of Contact Address

Bids will be publicly opened at the above-noted location immediately following the bid deadline. Late bids will not be considered.

Bids may be rejected for not complying with all prescribed public bidding procedures or for good cause on a finding by the College that it is in the public interest to do so. The College reserves the right to reject any bids and to waive irregularities.

The contract awarded under this invitation to bid is subject to the payment of prevailing wages under ORS 279C.800 to 279C.870 and the Davis-Bacon Act (40 USC §§ 3141 to 3148).

Applicable prevailing Davis-Bacon wage rate determinations for this solicitation are included with the solicitation documents.

Preq	ualification	of bidders	is $\square$ Rec	quired / 🛭	Not Req	uired.
		01 0100010		L	<u> </u>	

A non-mandatory prebid conference will be held on {Insert Day and Time} for bidders to familiarize themselves with the site conditions.

# **Bid Information**

### I. Introduction.

Columbia Gorge Community College (the "College") is a community College in the state of Oregon. The College creates opportunities and enriches communities by providing high-caliber, culturally-appropriate educational offerings, technical skills and lifelong learning. With campuses in The Dalles and Hood River, as well as online, the College offers a flexible schedule of affordable credit and non-credit courses taught by faculty members who have studied, taught, researched and volunteered around the globe. Each year, an average of 180 students graduate with certificates and degrees that prepare them for further study or to enter our local workforce.

The College intends to enter into a contract (the "Contract") under this invitation to bid (this "ITB") for the renovation of the College's Health and Sciences Simulation Lab. The selected bidder that executes the Contract may be referred to in this ITB as the "Contractor."

# II. ITB Schedule.

Advertisement/Release of Bid Document	
Prebid Conference (if any)	Non-mandatory on
Prequalification Applications Due (if required)	Not required
Written Questions, Protests, and Request for	{5 days before closing} Q&A responses will
Change Due Date	be posted to the CGCC
Last Day to Issue Addenda	{3 days before closing]
Bid Due Date and Time (the "Bid Closing")	
Bid Opening	{same as above]
First-Tier Subcontractor Disclosure Due Date	
and Time (Must be two hours after Bid	
Opening)	
Notice of Intent to Award the Contract	{7 days after close}
Contract Delivery Due Date	{7 days after NOIA}
Anticipated Project Start Date	November 1, 2023
Anticipated Project Completion Date	May 31, 2024

# III. Contact Details. All questions, clarifications, or protests of bid terms must be in writing and directed to:

Columbia Gorge Community College Daniel Saldivar 400 E Scenic Drive The Dalles, OR 97058 Phone 541-980-8202 Fax E-mail dsaldivar@cgcc.edu

IV. I	Prebid Conference.	The College X	will / 🔲 will not	t hold a prebid	conference. If I	neld, the
prebid c	onference will take p	lace at insert date	e, time, and Build	ding 1, 4 <sup>th</sup> Flo	or, Room 1452.	Attendance
at the co	onference by prospect	ive bidders is	/ 🛛 is not mand	latory. No sta	tement made by	the College
at a preb	oid conference is bind	ling unless it is co	onfirmed in a wri	itten addendui	m to this ITB.	
_						

- V. Prequalification. Prequalification under this ITB is: Required / Not Required. If required, bidders must be prequalified to perform work in the following classes: insert classes of work. Applications for prequalification must be filed at the address listed in Section III no later than insert date and time.
- VI. Description of the Project. Project components include interior renovations to approximately 2,576 sq. ft. on a single floor of the existing building used for the health sciences programs at the College. This is an older facility constructed in the 1960s. The project components include selective demolition and replacement of existing walls, ceilings, floors and casework that will be replaced with new interior construction including new floor finishes, new paint wall finishes, new ceiling tiles, and new windows to account for the additional students being brought into the health sciences programs. The building is located on the main College campus and its expansion will permit both increase class sizes and the placement of training equipment required for educational programs.

The Project will be partially funded with federal funds from the United States Department of Commerce, Economic Development Administration ("EDA") and therefore is subject to federal laws and regulations associated with that program. Because the Project is receiving federal grant funding, the Project, and the selected Proposer, will be subject to certain federally-imposed requirements. Proposers are encouraged to review Attachment X, Grant Materials, to learn more about the EDA's requirements for the Project and Project participants.

# VII. Bid Requirements.

### A. <u>Submittal Requirements</u>.

1. In order to be considered, bids are due at the location identified below by the Bid Closing. Bids must conform to the requirements of this ITB and be signed in ink by a person who is authorized to make such commitments on behalf of the bidder. Each bid must be submitted in a sealed opaque envelope that is addressed as follows:

Project Name: Renovation of the Health and Sciences Simulation Lab Columbia Gorge Community College
400 E Scenic Drive
The Dalles, OR 97058
Attn: Daniel Saldivar

Attn: Daniel Saldivar

Facilities, Basement of Building 1

Note: Bids submitted by fax or e-mail will not be accepted.

- 2. Each bid must include one fully executed copy of the Bid Form attached as Exhibit A and meet all the requirements set forth in it. The title of the bid and the bidder's name and address must be printed on the envelope. 1 copy is required.
- 3. Bidder's signature on the Bid Form constitutes a certification that the bidder has read and fully understands all bid terms. No consideration will be given to any claim resulting from proposing without comprehending all requirements of the bid documents.
- 4. The College is not responsible for the proper identification and handling of any bid that is not submitted with the required information clearly marked on the envelope. The College will not consider any bid received after the Bid Closing, which will be returned unopened.

# 5. Bids that do not provide all required information may be rejected.

- B. <u>Modifications to Bid.</u> A bidder may modify a bid in writing by submitting the modification to the address identified in Section III. The modification must state that it amends and supersedes the previous bid, be marked "Bid Modification," and include the solicitation document that the modification is associated with.
- C. <u>Bid Withdrawals</u>. Bids may be withdrawn in writing on company letterhead signed by an authorized representative if received by the College before the Bid Closing. Bids may also be withdrawn in person before the Bid Closing upon presentation of appropriate identification.
- D. <u>Contract</u>. The selected bidder must promptly execute a contract in substantially the form set forth in <u>Exhibit C</u>. The Contractor must comply with all State of Oregon Public Contracting Code provisions and other applicable laws and terms.

#### VIII. Bid Process.

- A. <u>Bid Documents</u>. Complete minimum specifications and required bid documents may be obtained from the contact and online as identified in Section III. Each bid will be irrevocable for a period of 60 days from the date of the bid opening. An award of a contract to any bidder does not constitute a rejection of any other bid.
- B. Protests of and Request for Changes to the Bid Documents. Any bidder that believes that a term of this ITB is unclear, conflicts with another term of this ITB, otherwise requires clarification, or that believes that terms of this ITB are unnecessarily restrictive, limit competition, or otherwise do not comply with applicable law or any contracting rule of the College, may submit a protest or request for clarification in writing to the contact identified in Section III.
- 1. The protest must include a detailed statement of the legal and factual grounds for the protest; a description of the resulting prejudice to the bidder; and a statement of the desired changes to the contract terms, including any specifications.
- 2. The protest must be marked "Bid Document Protest" or "Bid Document Request for Clarification" and identify the solicitation document that the request is associated with.

- 3. The College will promptly respond in writing to each written protest and when appropriate issue any revisions, substitutions, or clarifications by written addendum to all interested bidders. All changes or clarifications must be by written addendum to be valid and binding on the College.
- 4. No protest or request for clarification will be considered unless the College has received it at least 5 days before the Bid Closing. All issues relating to clarification or objection to any term of this ITB must be raised under this Section VIII.B. Any issue that could have been raised under Section VIII.B, but is not, cannot be a ground for protest of award.
- IX. Addenda to Bid. If it becomes necessary to revise or clarify any part of this ITB, written notification of addenda will be provided to all known bidders by email. Addenda will be posted electronically at <a href="https://www.cgcc.edu/purchasing/bid-announcements">https://www.cgcc.edu/purchasing/bid-announcements</a>. Bidders must acknowledge receipt of all addenda in the appropriate area of the Bid Form at <a href="Exhibit A">Exhibit A</a>, which must be returned as part of the bid. All addenda issued during the bid period will be incorporated into the Contract. No modification or clarification is binding on the College unless it is confirmed in a written addendum to this ITB.

# X. Preferences.

As required by ORS 279A.125, the College will prefer goods that are certified as made from recycled materials if the recycled product is available, meets applicable standards, can be substituted for a comparable nonrecycled product, and the cost does not exceed the costs of nonrecycled products by more than five percent, or a higher percentage if the College has made a written determination to that effect. The Contractor must use recyclable products to the maximum extent economically feasible in the performance of the work under this ITB.

XI. Nondiscrimination. Bidders must submit a certification of nondiscrimination, as required by ORS 279A.110(4). Bidders must certify that they have not and will not discriminate against a subcontractor in the awarding of a subcontract because the subcontractor is a disadvantaged business enterprise, a minority-owned, women-owned, or service-disabled-veteran-owned business, or an emerging small-business enterprise, as each is defined in ORS 200.005.

### XII. Public Disclosure.

- A. Pursuant to ORS 279C.365(4), bids will not be made available for public inspection until after opening.
- B. After opening, any information provided to the College under this ITB is subject to public disclosure under Oregon's Public Records Laws (ORS 192.311 to 192.478), unless it is specifically exempt from disclosure under ORS 192.338 to 192.355.
- C. Any bidder that desires the College to treat certain information as exempt from disclosure must plainly mark each page of such information as confidential and include the citation to the Public Records Law exemption that the bidder believes to apply to the information. Marked pages should be placed in a group separate from the remainder of the bid. Information that has not been properly marked and segregated will be deemed subject to disclosure by the College.

D. The College retains the right to make an independent determination of whether marked information is exempt under the Public Records Law. All bidders understand that any decision by the College to withhold information is subject to appeal and that the College will comply with any order to disclose.

#### XIII. Award of Contract.

- A. <u>Standard of Award</u>. Award of the Contract will be made to the lowest bidder whose bid substantially complies with the terms set forth in this ITB, who is a "responsible bidder" under the criteria set forth in ORS 279C.375(3), and who is in compliance with any other required public procurement procedure or term.
- B. <u>Award Notice</u>. The College will mail a written notice of award to all bidders. The written notice of award of the Contract constitutes a final decision of the College to award the contract unless the College receives a written protest of the notice of award within 7 days of the mailing of the notice of award. If a protest is timely filed, the notice of award will be a final decision of the College on issuance of a written decision denying the protest and affirming the award.
- C. <u>Award Protest</u>. Any bidder who is adversely affected by the College's notice of award of the Contract may file a written protest of award. A bidder is "adversely affected" only if the bidder is eligible for award of the Contract as the next lowest responsible bidder and is next in line for award. In other words, the protesting bidder must claim that all lower bidders are ineligible for award because their offers were nonresponsive; or the College committed a substantial violation of this this ITB or of an applicable procurement statute or administrative rule, and the protesting bidder was unfairly evaluated and would have, but for such substantial violation, been the responsible bidder offering the lowest bid.
- 1. A protest of award must be filed with the contact set forth in Section III within 7 days after issuance of the notice of intent to award. The College will not consider a protest submitted after 5:00 p.m. on the seventh day.
- 2. The written protest must specify the grounds on which the protest is based. An issue that could have been but was not raised as a request for clarification or protest of the bid documents is not grounds for a protest of award.
  - 3. The College will resolve all the written protests in writing.

### **XIV.** Reservation of Rights.

The College expressly reserves the following rights:

- 1. To reject any bids, as permitted by ORS 279C.395 or the ITB if in the public interest.
- 2. To reject any bid that is not in compliance with all prescribed public bidding procedures, including the requirement to demonstrate the bidder's responsibility under ORS 279C.375(3)(b).

- 3. To reject any bid that does not meet the specifications set forth in this ITB.
- 4. To waive any irregularities in any submitted bid.
- 5. To award any items or services contained in the bid.
- 6. To consider the competency and responsibility of bidders in making any award.
- 7. To re-award the Contract to the next-lowest responsible and responsive bidder if any bidder to whom the Contract is awarded defaults in executing it or providing a satisfactory performance bond within the time and in the manner required.

# XV. Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246) located at 41 CFR § 60-4.2:

- 1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
- 2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for minority participation for each trade	Goals for female participation in each trade
	3.8%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated

starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is Oregon, Wasco County, The Dalles.

# **EXHIBIT A**

# **BID FORM**

Enclose in a separate sealed opaque envelope.

•	ect Nam Date:	Renovation of the Health and Sciences Simulation Lab Insert date and time
Bid 1	From: _	
	_	ned hereby proposes to provide to the College all materials, services, and labor necessary to rork in connection with the project in strict accordance with the terms of the Invitation to
In su	bmitting	this bid, the undersigned agrees:
	a.	To provide all goods, equipment, and services to perform under the Contract.
	b.	To hold this bid open for 60 days from the date of the bid opening and to accept the provisions of the ITB regarding bid security.
	c.	To execute the Contract relating to this bid if the bid is selected.
	d.	To perform under the Contract according to the agreed-upon schedule.
1.	<b>Pri</b> ce	Bid:
The 1	price bid	must include one lump-sum cost for the proposed project.
		must be written in both words and figures. If there is a discrepancy between the two, the en in words will govern.
Bidd	er must	respond to each of the yes/no prompts below, otherwise the bid will not be considered.
2.	First-	Tier Subcontractor Disclosure:
	⊠ Re	equired <sup>1</sup> Not Required
	under tier su mater	uired, bidders must disclose information about certain first-tier subcontractors ORS 279C.370 on the Form attached as Exhibit D. A bidder must disclose first abcontractors that: (a) will be furnishing labor or will be furnishing labor and ials in connection with the public improvement contract; and (b) will have a act value that is equal to or greater than five percent of the total project bid or

<sup>&</sup>lt;sup>1</sup> Disclosure of First-Tier Contractors must be required if the contract is for a public improvement with an estimated cost of more than \$100,000, unless the public improvement contract has been exempted from competitive bidding requirements under ORS 279C.335(2).

3.	References:
	⊠ Required □ Not Required
	The Bidder Reference Form at Exhibit B must be completed and submitted as part of the bid.
4.	Addenda:
Comp	lete this section if any Addenda were issued and received.
	Bidder has received Addenda bidder must insert addenda numbers through bidder must insert the issue date of the most recently received addendum.
5.	Bid Security:
	⊠ Required □ Not Required
	Each bid must be accompanied by a certified or cashier's check payable to Columbia Gorge Community College, or a bond naming Columbia Gorge Community College as an obligee, in an amount of 10% of the total bid amount. Surety companies must be listed in Circular 570. Bidder agrees that (a) the Bid Security accompanying this bid will be held in escrow by the College to compensate for damages (including expenses and related attorney fees) that the College sustains as a result of the selected bidder's failure to execute and deliver the Contract and Performance and Payment Bond, and (b) if the selected bidder defaults in either executing the Contract or providing a Performance or Payment Bond within 10 days of receipt of the Notice of Award of the Contract, then the Bid Security may become the property of the College at its option. If, however, this bid is not accepted within 60 days of its submission date, or if the bidder executes and timely delivers the Contract and Performance and Payment Bonds, the Bid Security will be returned to the bidder.
6.	Performance, Payment, and Public Works Bonds:
	⊠ Required □ Not Required
	No later than 10 days after the receipt of the Notice of Award, the selected bidder must be prepared to execute the Contract provided by the College and to deliver performance and payment bonds to the College to the extent required under ORS 279C.380. The bidder must have also filed a public works bond with the Contractors Construction Board to the extent required under ORS 279C.836.
7.	Prevailing Wages Certification:
	This Contract is a "Public Works" contract within the meaning of ORS 279C.800 and is therefore subject to the following requirements.
	a. The contract awarded under this invitation to bid is subject to the payment of prevailing wages under ORS 279C.800 to 279C.870 and the Davis-Bacon Act (40 USC §§ 3141 to

\$15,000, whichever is greater, or \$350,000 regardless of the percentage of the total

project bid.

3148). The hourly rate of wage to be paid by Contractor and any Subcontractor to

workers in each trade or occupation required for the public works employed in the performance of the contract shall not be less than the specified minimum rate of wage in accordance with ORS 279C.838 and ORS 279C.840 and the Davis-Bacon Act, whichever is higher. In other words, in accordance with ORS 279C.830, the Contractor and any subcontractors must pay the higher of the applicable state or federal prevailing rate of wage to all workers in each trade or occupation required for the public works employed in the performance of the contract.

b. The latest prevailing wage rates for public works contracts in Oregon are contained in the following publications: The [date of most current publication] Prevailing Wage Rates for Public Works Projects in Oregon, the [date of most current publication] PWR Apprenticeship Rates, and [date of any amendments to the PWR rates or Apprenticeship rates since the most current publication of those rates.]. Such publications can be reviewed electronically at https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx and are hereby incorporated as part of the Contract Documents. [If the federal Davis/Bacon Act is applicable, this provision must be revised to so reflect per ORS 279C.830.]

By signing below, bidder certifies that bidder will pay the Oregon prevailing wage rate.

# 8. Nondiscriminatory Subcontractor Participation:

	<u> </u>	scriminate against disadvantaged business or service-disabled-veteran-owned businesses, or ing any subcontract relating to this ITB or any
	☐ Yes ☐ No	
9.	Resident Bidder:	
	Bidder certifies that bidder is a "resident bidd	er" as defined in ORS 279A.120:
	☐ Yes ☐ No	
10.	Construction Contractors Board or Lands	cape Contractors Board Registration:
	□ Required □ Not Required	
	The College will not consider a bid from a bid Construction Contractors Board, if required by Contractors Board, if required by ORS 671.53	y ORS 701.021, or the Oregon Landscape
	Construction Contractors Board Registration Number:	Expiration Date:
	Landscape Contractors Board	
	Registration Number:	Expiration Date:

11.	<b>Asbestos Abatement:</b>	
	☐ Required ☒ Not Required	
	Bidder must be licensed under ORS 468A.7	10 to perform asbestos abatement.
12.	Conflicts of Interest.	
	in the proposal has participated in the contra proposal is made in good faith without fraud	imployee of the College that has a pecuniary interest ct negotiations on the part of the College; that the large collusion, or connection of any kind with any other hat the proposer is competing solely on its own into any undisclosed person or firm.
13.	Oregon Office for Business Inclusion and	<b>Diversity Certification:</b>
	Please indicate whether your business is cert	tified under ORS 200.055 as any of the following:
	Minority Business Enterprise	☐ Women Business Enterprise
	☐ Emerging Small-Business Enterprise	Service-Disabled-Veteran Enterprise
14.	Bidder's Signature and Identification:	
	I hereby certify that this bid is genuine and t entity or person relating to this bid.	hat I have not entered into collusion with any other
Name	of Proprietor, Partnership, or Corporation:	
Autho	orized Official Name and Title (Please Print):	
Signat	ture of Authorized Official:	Date Signed:
Street	Address	City, State, and Zip Code
Mailir	ng Address (if different from street address)	City, State, and Zip Code
Phone	Number	Employer Federal ID Number

# **EXHIBIT B**

# **BIDDER REFERENCE FORM**

Provide a minimum of three references from different projects that the College may contact regarding the quality of workmanship or service that you or your firm has provided on projects of comparable size and scope. The list of references must include the following information:

1.	Company Name:
	Contact Name and Phone #:
	Address:
	Dates of Service:
	Contract Amount:
2	Company Name
۷.	Company Name:
	Contact Name and Phone #:
	Address:
	Dates of Service:
	Contract Amount:
3.	Company Name:
	Contact Name and Phone #:
	Address:
	Dates of Service:
	Contract Amount:

# **EXHIBIT C**

# FORM OF PROPOSED CONTRACT SEE FOLLOWING PAGES

# **EXHIBIT D**

# FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM (ORS 279C.370)

PROJECT NAME:				
BID #:	BID CLOSING:	DATE:	TIME:	
	itted at the location specified in thate after the advertised bid closing		on the advertised closing date and within two	o (2) working hours of the
the category of work tha		ning, and the dollar	Il be furnishing labor and materials and that it value of the subcontract. Enter "NONE" if	
NAME	DOLLA	AR VALUE	CATEGORY OF WORK	
1.	\$			
CCB#				
2.	\$			
CCB#				
3.	\$			
CCB#				
NON-RESPONSIVE B	BID WILL NOT BE CONSIDER	RED FOR AWARI		
Form submitted by (Bide	der Name):			
Contact Name:			Phone #:	
UNLESS OTHERWISE	STATED IN THE ORIGINAL S	OLICITATION, T	HIS DOCUMENT MAY NOT BE FAXED.	IT IS THE

RESPONSIBILITY OF BIDDERS TO SUBMIT THIS DISCLOSURE FORM AND ALL ADDITIONAL SHEETS, WITH THE BID NUMBER

AND PROJECT NAME CLEARLY MARKED, AT THE SAME LOCATION AS REQUIRED FOR THE BID BY THE SPECIFIED

DISCLOSURE DEADLINE. SEE SECTION II OF THE "BID INFORMATION" DOCUMENT.

D-1

# SECTION 00 5200 - AGREEMENT FORM

PART 1 GENERAL

- 1.01 FORM OF AGREEMENT
- 1.02 THE AGREEMENT TO BE EXECUTED IS ATTACHED FOLLOWING THIS PAGE.
- 1.03 RELATED REQUIREMENTS
  - A. Section 00 7200 General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

**END OF SECTION** 

# DRAFT AIA Document A101 - 2017

# Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

**AGREEMENT** made as of the « » day of « » in the year « » (In words, indicate day, month and year.)

#### **BETWEEN** the Owner:

(Name, legal status, address and other information)

```
« Columbia Gorge Community College »« »
« 400 E. Scenic Drive »
« The Dalles, Oregon 97058 »
« »
```

#### and the Contractor:

(Name, legal status, address and other information)

# for the following Project:

(Name, location and detailed description)

```
« Renovation of the Health and Sciences Stimulation Lab at Columbia Gorge
Community College »
«400 E Scenic Drive
The Dalles, OR 97058 »
```

#### The Architect:

(Name, legal status, address and other information)

**Soderstrom Architects** 1331 NW Lovejoy Street #775 Portland, OR 97209

The Owner and Contractor agree as follows.

#### 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.

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

The parties should complete A101®-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.



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#### TABLE OF ARTICLES

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- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
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- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

#### **EXHIBIT A INSURANCE AND BONDS**

#### ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

#### ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

#### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

[ « » ] The date of this Agreement.

[ (X) A date set forth in a notice to proceed issued by the Owner.

[ ( ) ] Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

July 28, 2023

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

#### § 3.3 Substantial Completion

§ 3.3.1—Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

	( » ] By the following date: May 31, 2024		
are to be	bject to adjustments of the Contract Time as completed prior to Substantial Completion of on of such portions by the following dates:		
	Portion of Work	Substantial Completion Date	
	the Contractor fails to achieve Substantial Coall be assessed as set forth in Section 4.5.	ompletion as provided in this S	ection 3.3, liquidated damages,
	Owner shall pay the Contractor the Contract The Contract Sum shall be « » (\$ « » ), sub		
§ 4.2 Alte § 4.2.1 Al	rnates ternates, if any, included in the Contract Sur	n:	
	Item	Price	1
execution	of this Agreement. Upon acceptance, the Oxlow each alternate and the conditions that m	wner shall issue a Modification	to this Agreement.
	Item	Price	Conditions for Acceptance
	owances, if any, included in the Contract Sun each allowance.)	n:	
	Item	Price	
	t prices, if any: the item and state the unit price and quantity		e unit price will be applicable.)
	t prices, if any:		e unit price will be applicable.)  Price per Unit (\$0.00)
(Identify t	t prices, if any: he item and state the unit price and quantity	limitations, if any, to which the Units and Limitations	
(Identify t	t prices, if any:  he item and state the unit price and quantity  Item  iidated damages, if any:  ms and conditions for liquidated damages, i	limitations, if any, to which the Units and Limitations	
§ 4.5 Liqu (Insert ter « »not ap	t prices, if any:  he item and state the unit price and quantity  Item  idated damages, if any:  ms and conditions for liquidated damages, i	limitations, if any, to which the Units and Limitations f any.)	Price per Unit (\$0.00)

[ ( ) Not later than ( ENTER ) ( ( ) calendar days from the date of commencement of the Work.

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User Notes:

net increase in the Contract Sum.

- 2 For Work performed by a Subcontractor of any tier, the Contractor may claim no more than five percent (5.0%) of the net increase in the Contract Sum.
- 3 For Work performed by a Subcontractor or Sub-subcontractor, the Subcontractor and Sub-subcontractors, collectively, may claim no more than ten percent (10.0%) the net increase in the Contract Sum.
- All general conditions or general requirements costs of the Contractor, related parties, and all Subcontractors of any tier are to be included in the overhead and profit allowance stated in this section and may not be separately stated or recovered via an increase to the Contract Sum.
- Subcontractor's overhead and profit includes all costs regarding office, home office and site overhead (including project manager, project engineer, other engineers, project foreman, estimator, superintendent and their vehicles and clerical assistants); taxes (except for sales tax); employee per diem, subsistence and travel; warranties; printing and copying; quality control/assurance; purchasing; small or hand tools that cost \$500 or less and are normally furnished by the performing contractor and expendable charges; preparation of as-built drawings; impacts on unchanged Work; Claim or Change Order preparation; and delay and impact costs of any kind.»

#### ARTICLE 5 PAYMENTS

### § 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and in the General Conditions. The application shall be in a form acceptable to the Owner..

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

**(( )** 

- § 5.1.3 Pursuant to ORS 279C.570, the Owner shall make payment to the Contractor not later than thirty (30) days after receipt of the Construction Manager's Application for Payment or 15 days following issuance of the Certificate for Payment, whichever is the earlier date. Late payments shall accrue interest at the rate set forth in ORS 279C.570(2).
- § 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.
- § 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.
- § 5.1.6 In accordance with AIA Document A201<sup>TM</sup>\_2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:
- § 5.1.6.1 The amount of each progress payment shall first include:
  - .1 That portion of the Contract Sum properly allocable to completed Work;
  - .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
  - .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.
- § 5.1.6.2 The amount of each progress payment shall then be reduced by:
  - .1 The aggregate of any amounts previously paid by the Owner;
  - .2 The amount of the progress payment will be adjusted by corrections made to prior Applications for Payment, when applicable;
  - **.3** Amounts not previously approved by the Owner or the Architect;

- .4 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .5 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .6 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .7 Retainage will be withheld from the total progress payment amount at five percent (5.0%) of the total amount due to the Contractor.
- § 5.1.6.3 As a condition of approval, but without limitation of any other conditions, each Application for Payment must contain written certification by the Contractor:
  - .1 That the Application for Payment represents an accurate estimate of the percentage of Work completed for each portion of the Work for which partial payment is sought;
  - .2 That to Contractor's best knowledge, no claims of lien and no bond claims have been asserted or perfected as of the date of the Application for Payment;
  - .3 That all amounts claimed for payment in the Application for Payment that are due and payable have been paid in full or will be paid from funds received pursuant to the Application for Payment;
  - .4 That all subcontractors and suppliers paid or to be paid pursuant to the Application for Payment have executed valid and binding conditional waivers of lien and bond rights and claims for payment through the date of the Application for Payment, which waivers are included with the Application for Payment;
  - .5 That Contractor has included its conditional signed waiver of any and all its lien and bond rights and other claims for payment through the date of the Application for Payment; and
  - .6 That there is no other known claim for payment against Owner, except as stated in the Application for Payment.

#### § 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

«Five Percent (5%). Retainage withheld shall be deposited in an interest bearing account in accordance with ORS 279C.550-580. Owner will pay net retainage balance as part of the final application for payment from Contractor, upon inspection approval completion and release of liens affidavit. Interest due to Contractor is paid direct from banking institution to Contractor»

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

«None. »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

«None. »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

**«** »

- § 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.
- § 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

### § 5.2 Final Payment

- § 5.2.1 The Owner's final payment to the Construction Manager shall be made no later than 30 days after the Owner's acceptance of the Engineer's final Certificate for Payment and after the following additional conditions have been satisfied:
  - .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of the General Conditions, and to satisfy other requirements, if any, which extend beyond final payment; and
  - .2 the Contractor has submitted a final application for payment with affidavits confirming the release of all lien claims, and a final Certificate for Payment has been issued by the Architect.
  - .3 Contractor has submitted for itself and for all its subcontractors and suppliers conditional final, executed, and binding certificates, releases, and waivers of all lien and bond rights and claims and all unresolved claims for payment in a form acceptable to Owner;
  - .4 Contractor has submitted to Owner all record or as-built plans, manuals, operation instructions, directions, safety manuals or guides, and any other deliverables required by the Contract Documents;
  - .5 all rights, warranties, title, and claims to materials, equipment, or systems supplied under this Agreement have been validly transferred to Owner or Owner's assignee; and
  - .6 all necessary inspections, approvals, licenses, and permits have been successfully obtained or properly excused and the Project may be occupied and used without restriction.
- § 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

**«** »

# § 5.3 Interest

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

Interest on payments due and unpaid under the Contract Documents shall bear interest as specified in ORS 279C.570.ARTICLE 6 DISPUTE RESOLUTION

## § 6.1 [Deleted.]§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[ « X » ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ « » ] Litigation in a court of competent jurisdiction

[ **« »** ] Other (Specify)

**«** »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

#### ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 [Deleted.]

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

#### ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

### § 8.2 The Owner's representative:

(Name, address, email address, and other information)

**TBD** 

Columbia Gorge Community College 400 East Scenic Drive

The Dalles, OR. 97058 Daniel Saldivar

TBD

**«** »

#### § 8.3 The Contractor's representative:

(Name, address, email address, and other information)

«[TBD] »

- **«** »
- **(( )**
- **«** »
- **«** »
- **«** »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

#### § 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101<sup>TM</sup>\_2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101<sup>TM</sup>\_2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203<sup>TM</sup>–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« As set forth in Section 1.6 of the General Conditions. »

§ 8.7 Other provisions:

« »

#### ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101<sup>TM</sup>–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101<sup>TM</sup>–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201<sup>TM</sup>–2017, General Conditions of the Contract for Construction

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User Notes:

.4 .5	Drawings			
	Number	Title	Date	
.6	Specifications			
	Section	Title	Date	Pages
.7	Addenda, if any:			
	Number	Date	Pages	
	Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.			
.8	Other Exhibits: (Check all boxes that apply and include appropriate information identifying the exhibit where required.)			
	[ <b>« »</b> ] AIA Document E204 <sup>TM</sup> –2017, Sustainable Projects Exhibit, dated as indicated below: (Insert the date of the E204-2017 incorporated into this Agreement.)			
	« »  [ « » ] The Sustainability Plan:			
	Title	Date	Pages	
	[ « » ] Supplementary and other Conditions of the Contract:			
	Document	Title	Date	Pages
.9	Other documents, if any, listed below: (List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201 <sup>TM</sup> _2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)			
	« Exhibit B, EDA Contracting Provisions for Construction Projects Exhibit C, Lobbying Restriction Form Exhibit D, Davis-Bacon Wage Determination»			
This Agreen	ment entered into as of the day	and year first written above.		
OWNER (	(Signature)	CONTRAC	CTOR (Signature)	

« »« »

(Printed name and title)

(Printed name and title)

« »« »



9

# SECTION 00 7200 - GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

**END OF SECTION** 

# DRAFT AIA Document A201 - 2017

### General Conditions of the Contract for Construction

### for the following PROJECT:

(Name and location or address)

« »

#### THE OWNER:

(Name, legal status and address)

« »« » « »

#### THE ARCHITECT:

(Name, legal status and address)

« »« » « »

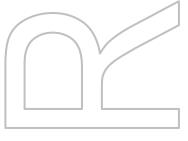
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For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.





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13.4.4

Certificates of Inspection, Testing or Approval

Architect's Authority to Reject Work

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Owner's Right to Terminate the Contract

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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.
- § 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.

§ 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.

### § 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

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.

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### § 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.

### § 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.

§ 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.

#### 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, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor 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

- § 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.

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.
- § 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
- .4 As provided in Section 7.3.4.

§ 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:

- .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

§ 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.

§ 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 reason for withholding 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

§ 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;
- failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .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.

### § 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.
- § 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

- .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
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, 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 Subcontractor, 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 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.

## § 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 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-year 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.
- § 12.2.2.3 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.

#### TERMINATION OR SUSPENSION OF THE CONTRACT ARTICLE 14

### § 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 Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:
  - Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be
  - .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
  - 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.
- § 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:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- 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

- 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

§ 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;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;
- 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

- 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

§ 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
- § 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.
- § 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.
- § 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.

### SECTION 01 2500 - SUBSTITUTION PROCEDURES

### PART 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- A. Section 00 2113 Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Section 01 3000 Administrative Requirements: Submittal procedures, coordination.
- C. Section 01 6000 Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

### 1.02 DEFINITIONS

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

### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

#### 3.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    - a. Project Information:
    - b. Substitution Request Information:
      - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
      - 2) Indication of whether the substitution is for cause or convenience.
      - 3) Issue date.
      - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).

- 5) Description of Substitution.
- 6) Reason why the specified item cannot be provided.
- 7) Differences between proposed substitution and specified item.
- 8) Description of how proposed substitution affects other parts of work.
- c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
- d. Impact of Substitution:
  - 1) Savings to Owner for accepting substitution.
  - 2) Change to Contract Time due to accepting substitution.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

### 3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
  - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

### 3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Architect will consider requests for substitutions only within 15 days after date of Agreement.
- B. Substitutions will not be considered under one or more of the following circumstances:
  - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  - 2. Without a separate written request.
  - 3. When acceptance will require revisions to Contract Documents.

### 3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- Architect will notify Contractor in writing of decision to accept or reject request.

### 3.05 ACCEPTANCE

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

### 3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

### **END OF SECTION**

### SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

### PART 1 GENERAL

#### 1.01 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: General product requirements.

#### 1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
  - 1. Requests for Interpretation (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 11. Closeout submittals.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

### 3.01 PRECONSTRUCTION MEETING

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - Contractor.

#### C. Agenda:

- 1. Execution of Owner-Contractor Agreement.
- 2. Submission of executed bonds and insurance certificates.
- Distribution of Contract Documents.
- 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
- 5. Designation of personnel representing the parties to Contract and Architect.
- 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
- 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

#### 3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
  - Contractor.
  - Owner.
  - 3. Architect.
  - 4. Contractor's superintendent.
  - Major subcontractors.

# D. Agenda:

- 1. Review minutes of previous meetings.
- Review of work progress.
- 3. Field observations, problems, and decisions.
- 4. Identification of problems that impede, or will impede, planned progress.
- 5. Review of submittals schedule and status of submittals.
- 6. Maintenance of progress schedule.
- 7. Corrective measures to regain projected schedules.
- 8. Planned progress during succeeding work period.
- 9. Maintenance of quality and work standards.
- 10. Effect of proposed changes on progress schedule and coordination.
- 11. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

#### 3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

# 3.04 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
  - An interpretation, amplification, or clarification of some requirement of Contract
    Documents arising from inability to determine from them the exact material, process, or
    system to be installed; or when the elements of construction are required to occupy the
    same space (interference); or when an item of work is described differently at more than
    one place in Contract Documents.
  - A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.

- Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
- Do not forward requests which solely require internal coordination between subcontractors.
- Prepare in a format and with content acceptable to Owner.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  - 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  - 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section 01 6000 Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  - 2. Owner's, Architect's, and Contractor's names.
  - 3. Discrete and consecutive RFI number, and descriptive subject/title.
  - 4. Issue date, and requested reply date.
  - Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
  - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  - 2. Note dates of when each request is made, and when a response is received.
  - 3. Highlight items requiring priority or expedited response.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and

follow up with an appropriate Change Order request to Owner.

# 3.05 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
  - Submit at the same time as the preliminary schedule specified in Section 01 3216 -Construction Progress Schedule.
  - 2. Coordinate with Contractor's construction schedule and schedule of values.
  - Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.

# 3.06 SUBMITTALS FOR REVIEW

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

# 3.07 SUBMITTALS FOR PROJECT CLOSEOUT

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

# 3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
  - 1. After review, produce duplicates.
  - Retained samples will not be returned to Contractor unless specifically so stated.

# 3.09 SUBMITTAL PROCEDURES

- A. General Requirements:
  - 1. Use a separate transmittal for each item.

- 2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
- 3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
- 4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
  - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
- 5. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
- 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
  - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
  - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
  - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
- 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
- 8. Provide space for Contractor and Architect review stamps.
- 9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

# B. Product Data Procedures:

- 1. Submit only information required by individual specification sections.
- 2. Collect required information into a single submittal.
- 3. Submit concurrently with related shop drawing submittal.
- 4. Do not submit (Material) Safety Data Sheets for materials or products.

# C. Shop Drawing Procedures:

- Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
- 2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

# 3.10 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "No Exception Taken", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.

- 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
- c. "make corrections noted and proceed", or language with same legal meaning.
- 2. Not Authorizing fabrication, delivery, and installation:
- E. Architect's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" no further action is required from Contractor.

# SECTION 01 4000 - QUALITY REQUIREMENTS

# PART 1 GENERAL

#### 1.01 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
  - 1. Temporary sheeting, shoring, or supports.
  - 2. Temporary scaffolding.
  - 3. Temporary bracing.
  - 4. Temporary hoist(s) and rigging.

#### 1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

#### 1.03 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

#### PART 3 EXECUTION

# 2.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.

- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

# 2.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work.

  Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

# 2.03 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner will direct an appropriate remedy or adjust payment.

# SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

# PART 1 GENERAL

# 1.01 RELATED REQUIREMENTS

A. Section 01 5813 - Temporary Project Signage.

#### 1.02 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-ofway and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### 1.03 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

# 1.04 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

# 1.05 PROJECT SIGNS - SEE SECTION 01 5813

# 1.06 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

# SECTION 01 5813 - TEMPORARY PROJECT SIGNAGE

# PART 1 GENERAL

# 1.01 SECTION INCLUDES

A. Project identification sign.

#### 1.02 REFERENCE STANDARDS

A. FHWA (SHS) - Standard Highway Signs and Markings 2004, with Supplement (2012).

#### 1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

# PART 2 PRODUCTS

#### 2.01 SIGN MATERIALS

- A. Structure and Framing: New, wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.
- C. Paint and Primers: Exterior quality, two coats; sign background of white color.

# 2.02 PROJECT IDENTIFICATION SIGN

- A. One painted sign of construction, design, and content indicated on following drawings, location designated on site plan drawing.
- B. Content
  - 1. Colors:
    - a. Jet Black
    - b. Blue PMS 300
    - c. Gold PMS 7406
  - 2. Messages and Fonts:
    - a. Message "US DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION" in Bank Gothic Medium.
    - b. Message "In partnership with" in Univers 55 Oblique.
    - c. Message "Columbia Gorge Community College" in Univers Extra Black 85.
- C. Lettering height: asindicated on following drawing.

# PART 3 EXECUTION

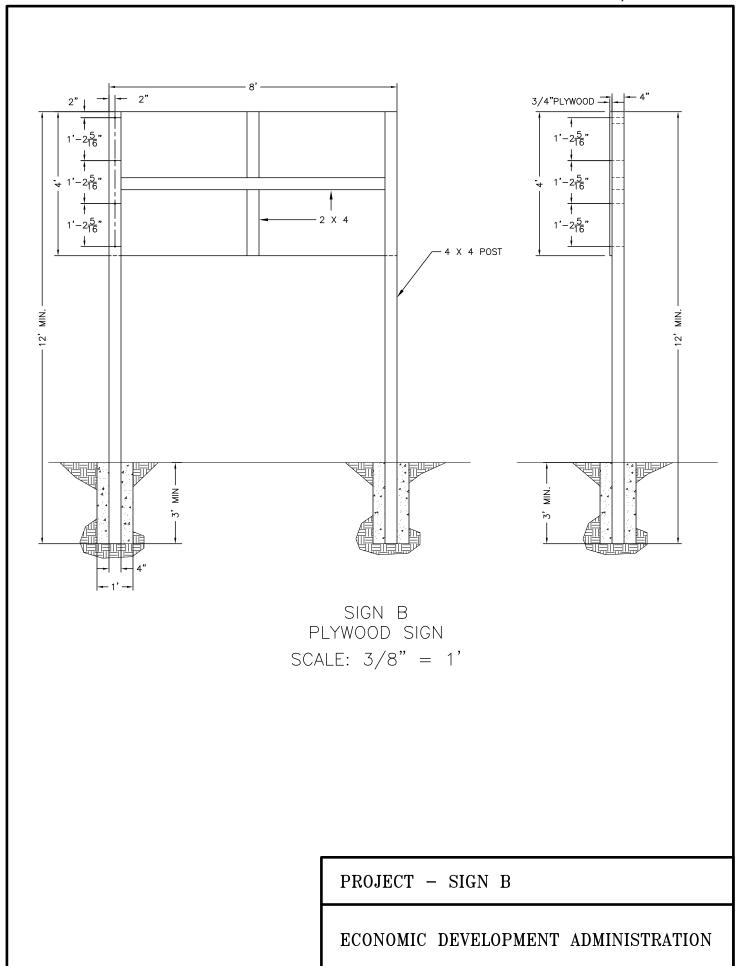
# 3.01 INSTALLATION

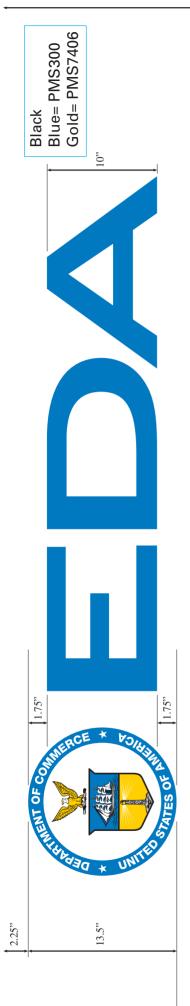
- A. Erect at designated location.
- B. Install sign surface plumb and level, with butt joints. Anchor securely.
- C. Paint exposed surfaces of sign, supports, and framing.

# 3.02 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

OMB Number: 0610-0096 Expiration Date: 11/30/2021





U.S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION

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# In partnership with

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<EDA Grant Recipient Name>

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# SECTION 01 6000 - PRODUCT REQUIREMENTS

# PART 1 GENERAL

# 1.01 RELATED REQUIREMENTS

A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

#### 1.02 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within 15 days after date of Agreement.
  - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

# PART 2 PRODUCTS

#### 2.01 NEW PRODUCTS

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

# 2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

#### PART 3 EXECUTION

# 3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

#### 3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

#### 3.03 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

# SECTION 01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

# PART 1 GENERAL

# 1.01 RELATED REQUIREMENTS

- A. Section 01 5000 Temporary Facilities and Controls: Temporary exterior enclosures.
- B. Section 01 5000 Temporary Facilities and Controls: Temporary interior partitions.

#### 1.02 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.

# 1.03 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of work of separate sections.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

# PART 2 PRODUCTS

# 2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 Product Requirements.

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work.

  Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

# 3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

# 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

#### 3.04 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.

- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  - Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
  - Remove items indicated on drawings.
  - 2. Relocate items indicated on drawings.
  - Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  - Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  - Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
  - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  - 3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
  - Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces
    to remain to the specified condition for each material, with a neat transition to adjacent
    finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

# 3.05 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Patching:
  - Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

# 3.06 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

#### 3.07 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

# 3.08 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

#### 3.09 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

# 3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

#### 3.11 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

# 3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Owner.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

# 3.13 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

# SECTION 02 4100 - DEMOLITION

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.
- B. Cutting, coring, fitting, and patching as required in existing construction.

#### 1.02 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
  - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
- C. Demolition firm qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

# PART 2 PRODUCTS

# 2.01 MATERIALS

- A. New Materials: Use materials specified in technical sections of these specifications.
- B. Existing Materials: Determine type and quality of existing materials by inspecting and testing products where necessary.

#### PART 3 EXECUTION

#### 3.01 DEMOLITION

- A. Within area of work, remove interior partitions, floor finishes, window shades, and other items identified on drawings.
- B. Within area of work, remove electrical and mechanical items identified to not remain. Protect utilities to remain.
- C. Remove other items indicated, for salvage, relocation, and recycling.

# 3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers and security devices.
  - Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
- B. Do not begin removal until built elements to be salvaged or relocated have been removed.

- C. Protect existing structures and other elements to remain in place and not removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

#### E. Hazardous Materials:

- If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
  - 1. Dismantle existing construction and separate materials.
  - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- G. Match work that has been cut to adjacent work.
- H. Remove and replace defective and non-conforming work.

# 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Include interruptions to existing utilities in the Work Progress Schedule.
- D. Do not disrupt public utilities without permit from authority having jurisdiction.
- E. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- F. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- G. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- H. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- Maintain operation of existing fire sprinkler system. Notify Owner 5 days before system or parts
  of system must be inactive to allow tie-in of new work. Minimize hazardous exposures during
  time fire sprinkler system is out of service.

# 3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
  - 1. Verify construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

- B. Separate areas in which demolition is being conducted from areas that remain occupied.
  - Provide, erect, and maintain temporary dustproof partitions of construction.
  - Noise, Dust, Vibration, and Odors: Operations that may result in high levels of noise, dust, vibration, odors, or other disruption to occupants will not be allowed without mitigating measures acceptable to Owner.
- C. Remove existing work as indicated and required to accomplish new work.
  - Remove items indicated on drawings.
  - 2. Remove and replace defective and non-conforming work.
  - 3. Repair existing areas and new work damaged by subsequent work.
- D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components and if necessary, modify installation to allow access or provide access panel.
  - Where existing systems or equipment are not active and the work requires reactivation, put back into operational condition. Repair supply, distribution, and equipment as required.
  - Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections. Minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities before removal.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
  - 1. Prevent movement of structure. Provide shoring and bracing as required.
  - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch to match new work.
- F. Clean existing systems and equipment that become unclean due to the work.

#### 3.05 CUTTING AND PATCHING

- A. Execute cutting, coring, and demolition by methods which will assure safety, will prevent damage to other work or existing areas to remain, and will provide proper surfaces to receive repairs.
- B. Pneumatic tools will not be allowed without prior written approval.
- Fit work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- D. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
- E. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes. Where not specified, match existing materials and finishes for color, texture, and appearance.

- F. Where removal results in adjacent spaces becoming one, rework floors and ceilings to provide smooth planes without breaks, steps or bulkheads, unless otherwise indicated.
- G. Unless shown otherwise, perform cutting so that a smooth transition with new work is possible and terminate existing surface along a straight line at a natural line of division.
- H. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Port review and request instructions.
- I. Restore work that has been cut or removed.
- J. When new work abuts or finishes flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance so that the patch or transition is invisible from a normal viewing distance.
- K. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
  - 1. For continuous surfaces, refinish to nearest intersection or natural break.
  - 2. For an assembly, refinish the entire unit.
- LAt completion of work of each trade, clean area and make surfaces ready for work of successive trades.
- M. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
- N. At completion of work in each area, return space to a condition suitable for use.

#### 3.06 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

# SECTION 06 4100 - ARCHITECTURAL WOOD CASEWORK

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Plastic laminate countertops.
- C. Hardware.
- D. Preparation for installing utilities.

#### 1.02 REFERENCE STANDARDS

- A. ANSI A208.2 Medium Density Fiberboard (MDF) for Interior Applications 2022.
- B. AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).

C.

- D. AWMAC/WI (NAAWS) North American Architectural Woodwork Standards 2021, with Errata.
- E. BHMA A156.9 Cabinet Hardware 2020.
- F. HPVA HP-1 American National Standard for Hardwood and Decorative Plywood 2020.
- G. NEMA LD 3 High-Pressure Decorative Laminates 2005.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS).
- C. Product Data: Provide data for hardware accessories.

# 1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.
  - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Quality Certification:
  - Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 2. Provide designated labels on shop drawings as required by certification program.
  - 3. Provide designated labels on installed products as required by certification program.
  - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
  - 5. Replace, repair, or rework all work for which certification is refused.

# 1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.06 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

# PART 2 PRODUCTS

# 2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
  - 1. Finish Exposed Exterior Surfaces: Decorative laminate.
  - 2. Finish Exposed Interior Surfaces: Decorative laminate.
  - 3. Finish Semi-Exposed Surfaces: Decorative laminate.
  - 4. Finish Concealed Surfaces: Manufacturer's option.
  - 5. Casework Construction Type: Type A Frameless.
  - 6. Adjustable Shelf Loading: 40 psf.
    - a. Deflection: L/144.
  - 7. Cabinet Style: Reveal overlay.
  - 8. Cabinet Doors and Drawer Fronts: Flush style.
  - 9. Drawer Construction Technique: Dovetail joints.

#### 2.02 WOOD-BASED COMPONENTS

- A. Provide sustainably harvested wood, certified or labeled; see Section 01 6000.
- B. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
- C. Composite Wood Panels: Containing no urea-formaldehyde resin binders.

# 2.03 PANEL CORE MATERIALS

- A. Hardwood Plywood: HPVA HP-1 Grade A; veneer core, type of glue recommended for application.
- B. Medium Density Fiberboard (MDF): Composite panel composed of cellulosic fibers, additives, and bonding system; cured under heat and pressure; comply with ANSI A208.2.
  - 1. Products:
    - a. Roseburg Forest Products; Medite II MDF: www.roseburg.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.
- C. Medium Density Fiberboard (MDF), Moisture Resistant: Composite panel composed of cellulosic fibers, additives, and waterproof resin bonding system; cured under heat and pressure; comply with ANSI A208.2.
  - 1. Products:
    - a. Roseburg Forest Products; Medex MDF: www.roseburg.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.

# 2.04 LAMINATE MATERIALS

- A. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- B. Provide specific types as indicated.

- 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, color as selected, finish as indicated.
- 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, color as selected, finish as indicated.
- 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, color as selected, finish as indicated.
- 4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

#### 2.05 COUNTERTOPS

- A. Countertops, Natural Quartz and Resin Composite: See Section 12 3600.
- B. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

#### 2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- C. Concealed Joint Fasteners: Threaded steel.
- D. Grommets: Standard plastic set with cap and liner grommets for cut-outs, in color to match adjacent surface; match to Doug Mockett & Company, Inc, TG Flip-Top Series 2" Hole Desk Grommet.

# 2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated self rests, zinc electroplate with clear coat finish, for nominal 1/2 inch spacing adjustments.
- C. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, stainless steel finish, for nominal 2 inch spacing adjustments.
- D. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
  - 1. Materials: Steel; T-shape or L-shape cross-section.
    - a. Finish: Manufacturer's standard, factory-applied, powder coat.
    - b. Size: Suited to support counter depth.
  - 2. Products:
    - a. Rakks/Rangine Corporation; EH Series Brackets: www.rakks.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.
- E. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- F. Cabinet Locks: Keyed cylinder, two keys per lock, to accommodate master key system as specified in Section 08 7100, steel with satin chrome finish..
- G. Catches: Magnetic with plastic case...
- H. Drawer Slides:
  - 1. Type: Full extension.
  - 2. Static Load Capacity: Heavy Duty grade.

- 3. Mounting: Side mounted.
- 4. Stops: Integral type.
- 5. Features: Provide self closing/stay closed type.
- 6. Manufacturers:
  - a. Accuride International, Inc: www.accuride.com/#sle.
  - b. Grass America Inc: www.grassusa.com/#sle.
  - c. Hettich America, LP: www.hettich.com/#sle.
  - d. Knape & Vogt Manufacturing Company: www.knapeandvogt.com/#sle.
  - e. Substitutions: See Section 01 6000 Product Requirements.
- I. Hinges: Non-mortise, five-knuckle, institutional overlay type, steel with polished finish.
  - 1. Manufacturers:
    - a. Hardware Resources: www.hardwareresources.com/#sle.
    - b. Fastec: www.fastecindustrial.com.
    - c. Rockford Process Control LLC: www.rockfordprocesshingesandhardware.com.
    - d. Substitutions: See Section 01 6000 Product Requirements.

#### 2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- C. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
  - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
  - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

# PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

#### 3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.

# 3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

# 3.04 CLEANING

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

# SECTION 06 8316 - FIBERGLASS REINFORCED PANELING

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

# 1.02 REFERENCE STANDARDS

- A. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2023, with Editorial Revision.
- B. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- C. ASTM D5319 Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2022.
- D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.
- E. FM 4880 Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials 2017.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 4 by 4 inch in size illustrating material and surface design of panels.

# 1.04 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

# PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Fiberglass Reinforced Plastic Panels:
  - As indicated in Drawings Finish Legend
  - 2. Substitutions: See Section 01 6000 Product Requirements.

# 2.02 PANEL SYSTEMS

# A. Wall Panels:

- 1. Panel Size: 4 by 8 feet.
- 2. Panel Thickness: 0.09 inch.
- 3. Surface Design: Embossed.
- 4. Color: White.
- 5. Attachment Method: Adhesive only, with trim and sealant in joints.

#### 2.03 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
  - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

- 2. Class 1 fire rated when tested in accordance with FM 4880.
- 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- 4. Impact Strength: Greater than 10 ft lb force per inch, when tested in accordance with ASTM D256.
- B. Trim: Aluminum; satin anodized; aluminum trim manufactured by Marlite or Nudo.
- C. Adhesive: Type recommended by panel manufacturer.
- D. Sealant: Silicone; white.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

#### 3.02 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

# SECTION 08 1213 - HOLLOW METAL FRAMES

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal frames for non-hollow metal doors.

#### 1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Hardware, silencers, and weatherstripping.

#### 1.03 REFERENCE STANDARDS

- A. ADA Standards 2010 ADA Standards for Accessible Design 2010.
- B. ANSI/SDI A250.8 Specifications for Standard Steel Doors and Frames (SDI-100) 2023.
- C. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- D. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- E. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2023.
- F. BHMA A156.115 Hardware Preparation in Steel Doors and Frames 2016.
- G. ICC A117.1 Accessible and Usable Buildings and Facilities 2017.
- H. NAAMM HMMA 830 Hardware Selection for Hollow Metal Doors and Frames 2002.
- I. NAAMM HMMA 831 Hardware Locations for Hollow Metal Doors and Frames 2011.
- J. NAAMM HMMA 861 Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- K. SDI 117 Manufacturing Tolerances for Standard Steel Doors and Frames 2023.

# 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

# PART 2 PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Door Frame Type: Provide hollow metal door frames with applied casings.
- B. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

- C. Accessibility: Comply with ICC A117.1 and ADA Standards.
- D. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830, NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

# 2.02 HOLLOW METAL DOOR FRAMES WITH APPLIED CASINGS

- A. Frame Type: Knockdown, slip-on drywall frames; separate jambs and head with separate snap-on casings both sides; factory-applied finish on exposed surfaces.
  - 1. Frame Material: Cold-rolled steel complying with ASTM A1008/A1008M.
  - 2. Casing Material: Formed steel.
  - 3. Casing Profile: C-Series.
  - 4. Finish: Factory-applied baked enamel finish, or electrostatically applied water-based paint.
    - a. Color: As selected from manufacturer's full line.
- B. Interior Door Frames. Non-Fire-Rated:
  - 1. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.

#### 2.03 ACCESSORIES

A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

#### PART 3 EXECUTION

# 3.01 EXAMINATION

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

# 3.02 INSTALLATION

- A. Install frames in accordance with manufacturer's instructions and related requirements of specified frame standards or custom guidelines indicated.
- B. Install prefinished frames after painting and wall finishes are complete.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.
- E. Coordinate installation of electrical connections to electrical hardware items.
- F. Touch up damaged factory finishes.

#### 3.03 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

# SECTION 08 1416 - FLUSH WOOD DOORS

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; non-rated.

# 1.02 REFERENCE STANDARDS

- A. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- B. AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) North American Architectural Woodwork Standards 2021, with Errata.
- D. WDMA I.S. 1A Interior Architectural Wood Flush Doors 2021, with Errata (2022).

#### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Samples: Submit two samples of door veneer, 2 by 2 inches in size illustrating wood grain, stain color, and sheen.
- D. Warranty, executed in Owner's name.

# 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

# 1.05 WARRANTY

- A. See Section 01 7800 Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
  - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

# PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
  - 1. Masonite Architectural: www.architectural.masonite.com/#sle.
  - 2. Oregon Door: www.oregondoor.com/#sle.
  - 3. VT Industries, Inc: www.vtindustries.com/#sle.
  - 4. Substitutions: See Section 01 6000 Product Requirements.

# 2.02 DOORS

A. Doors:

- 1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
- 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
  - Provide solid core doors at each location.

#### 2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

#### 2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Natural birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
  - 1. Vertical Edges: Same species as face veneer.

# 2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
  - 1. Provide solid blocks at lock edge for hardware reinforcement.
  - 2. Provide solid blocking for other throughbolted hardware.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

# 2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 Finishing for grade specified and as follows:
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
  - Transparent:
    - a. Manufacturers standard, in compliance with performance duty level indicated.
    - b. Sheen: Satin.
- C. Seal door top edge with color sealer to match door facing.

#### 2.07 ACCESSORIES

- A. Glazed Openings:
  - 1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.
  - 2. Glazing: Single vision units, 1/4 inch thick glass.
  - 3. Tint: Clear.

#### PART 3 EXECUTION

# 3.01 EXAMINATION

A. Verify existing conditions before starting work.

- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

# 3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

#### 3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

# 3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

### SECTION 08 7100 - DOOR HARDWARE

### PART 1 GENERAL

## 1.01 REFERENCE STANDARDS

- A. ADA Standards 2010 ADA Standards for Accessible Design 2010.
- B. BHMA A156.1 Standard for Butts and Hinges 2021.
- C. BHMA A156.2 Bored and Preassembled Locks and Latches 2022.
- D. BHMA A156.4 Door Controls Closers 2019.
- E. BHMA A156.5 Cylinders and Input Devices for Locks 2020.
- F. BHMA A156.7 Template Hinge Dimensions 2016.
- G. BHMA A156.16 Auxiliary Hardware 2018.
- H. BHMA A156.18 Materials and Finishes 2020.
- I. BHMA A156.22 Standard for Gasketing 2021.
- J. BHMA A156.115W Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.
- K. ICC A117.1 Accessible and Usable Buildings and Facilities 2017.

### 1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Keying Requirements Meeting:
  - 1. Attendance Required:
    - a. Contractor.
    - b. Owner.
    - c. Hardware Installer.
  - 2. Agenda:
    - a. Establish keying requirements.
  - 3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
  - 4. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
  - 5. Deliver established keying requirements to manufacturers.

# 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
  - Prepared by or under supervision of Architectural Hardware Consultant (AHC).

- 2. Provide complete description for each door listed.
- 3. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.

# D. Keying Schedule:

1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

### 1.04 WARRANTY

- A. See Section 01 7800 Closeout Submittals for additional warranty requirements.
- B. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.
  - 1. Closers: Five years, minimum.
  - 2. Locksets and Cylinders: Three years, minimum.
  - 3. Other Hardware: Two years, minimum.

### PART 2 PRODUCTS

### 2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
  - 1. Applicable provisions of federal, state, and local codes.
  - 2. Accessibility: ADA Standards and ICC A117.1.
  - Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.

### D. Fasteners:

- 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
  - a. Aluminum fasteners are not permitted.
  - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
- Concealed Fasteners: Do not use through or sex bolt type fasteners.

### 2.02 HINGES

- A. Hinges: Comply with BHMA A156.1, Grade 1.
  - 1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
    - a. Provide hinge width required to clear surrounding trim.
  - 2. Provide hinges on every swinging door.
  - 3. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
  - 4. Provide ball-bearing hinges at each door with closer.
  - 5. Provide following quantity of butt hinges for each door:
    - a. Doors From 60 inches High up to 90 inches High: Three hinges.

## 2.03 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.
  - 1. Flush Bolt Throw: 3/4 inch, minimum.
  - 2. Provide extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.

- a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
- 3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
- 4. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.

## 2.04 LOCK CYLINDERS

#### A. Manufacturers:

- Basis of Design: Schlage.
- 2. Substitutions: See Section 01 6000 Product Requirements.
- B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
  - 1. Provide standard and small format interchangeable core (SFIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
  - 2. Provide cylinders from same manufacturer as locking device.
  - 3. Provide cams and/or tailpieces as required for locking devices.

### 2.05 CYLINDRICAL LOCKS

#### A. Manufacturers:

- 1. Basis of Design: Schlage ND series with lever handle.
- 2. Substitutions: See Section 01 6000 Product Requirements.
- B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
  - 1. Bored Hole: 2-1/8 inch diameter.
  - 2. Latchbolt Throw: 1/2 inch, minimum.
  - Backset: 2-3/4 inch unless otherwise indicated.
  - 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.

### 2.06 CLOSERS

- A. Manufacturers; Surface Mounted:
  - 1. Basis of Design: LCN 4010 and 4110 series with hold open arm.
  - 2. Substitutions: See Section 01 6000 Product Requirements.
- B. Closers: Comply with BHMA A156.4, Grade 1.
  - 1. Type: Surface mounted to door.
  - 2. At corridor entry doors, mount closer on room side of door.

### 2.07 KICK PLATES

### A. Manufacturers:

- 1. Basis of Design: Ives 8400 stainless steel.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
  - 1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

### 2.08 WALL STOPS

- A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
  - 1. Type: Bumper, concave, wall stop.
  - 2. Material: Aluminum housing with rubber insert.

### 2.09 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
  - 1. Basis of Design: Pemko S44D x HSS2000.
  - 2. Substitutions: See Section 01 6000 Product Requirements.
- B. Weatherstripping and Gasketing: Comply with BHMA A156.22.

#### 2.10 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
  - 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

## 3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
  - 1. Mounting heights in compliance with ADA Standards:
    - a. Locksets: 40-5/16 inch.

#### 3.03 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

## 3.04 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

#### 3.05 HARDWARE SCHEDULE

- A. Group A
  - 1. Hinges
  - 2. Lockset entrance/office function
  - 3. Closer LCN 4040
  - 4. Wall stop
  - Gasketing
- B. Group B
  - 1. Hinges
  - 2. Lockset entrance/office function
  - 3. Closer LCN 4110 with parallel arm
  - 4. Gasketing
- C. Group C

- 1. Hinges
- 2. Lockset at active leaf entrance/office function
- 3. Flush bolts at inactive leaf
- 4. Closer at active leaf LCN 4110 with parallel arm
- 5. Gasketing
- D. Group D
  - 1. Hinges
  - 2. Lockset storage function
  - 3. Wall stop

## SECTION 08 8000 - GLAZING

### PART 1 GENERAL

### 1.01 REFERENCE STANDARDS

- A. 16 CFR 1201 Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings -Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
- C. ASTM C864 Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- D. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1193 Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).
- F. ASTM C1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021a.
- G. GANA (GM) GANA Glazing Manual 2022.
- H. GANA (SM) GANA Sealant Manual 2008.

## 1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

#### 1.03 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) for glazing installation methods.

### 1.04 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

### PART 2 PRODUCTS

#### 2.01 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Kind FT Fully Tempered Type: Complies with ASTM C1048.
  - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

### 2.02 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
  - 1. Applications: Doors.
  - 2. Glass Type: Fully tempered float glass.
  - 3. Tint: Clear.
  - 4. Thickness: 3/8 inch, nominal.
- B. Transparent One-Way Mirror: Mirror quality float glass with pyrolytic coating located on high light level surface of glass; ASTM C1376.
  - 1. Applications: Relites at control room.
  - 2. Thickness: 3/8 inch.
  - 3. Glass Tint: Grey.

- 4. Glass Type: Fully tempered or laminated.
- 5. Manufacturers:
  - a. Pilkington North America Inc; Pilkington Mirropane Transparent Mirror.
  - b. Substitutions: See Section 01 6000 Product Requirements.

### 2.03 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option
   II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

#### PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

### 3.02 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Set glass lites in proper orientation so that reflective coatings face Sim Lab rooms.
- D. Prevent glass from contact with any contaminating substances that may be the result of construction operations.

### 3.03 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Acoustic insulation.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

#### 1.02 REFERENCE STANDARDS

- A. AISI S220 North American Standard for Cold-Formed Steel Nonstructural Framing 2020.
- B. AISI S240 North American Standard for Cold-Formed Steel Structural Framing 2015, with Errata (2020).
- C. ASTM A1003/A1003M Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.
- D. ASTM C1007 Standard Specification for Installation of Load Bearing (Transverse and Axial)
   Steel Studs and Related Accessories 2020.
- E. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- F. ASTM C665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2023.
- G. ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- H. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board 2020.
- ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2022.
- J. ASTM C1047 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- K. ASTM C1396/C1396M Standard Specification for Gypsum Board 2017.
- L. GA-216 Application and Finishing of Gypsum Panel Products 2021.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

## 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

### PART 2 PRODUCTS

### 2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.

#### 2.02 METAL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
- B. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
  - 1. Studs: C-shaped.
  - Runners: U shaped, sized to match studs.
  - 3. Resilient Furring Channels: Single leg configuration; 1/2 inch channel depth.
    - a. Products:
      - ClarkDietrich; RC Deluxe Resilient Channel: www.clarkdietrich.com/#sle.
      - Phillips Manufacturing Co; RC-2 Resilient Sound Channel: www.phillipsmfg.com/#sle.
      - 3) Substitutions: See Section 01 6000 Product Requirements.
  - 4. Sill Plate Isolation Pads: Acoustical separation between sole plate and subfloor.
    - a. Products:
      - AcoustiGuard WILREP LTD; Iso-Sill Rubber Isolation Pad: www.acoustiguard.com/#sle.
      - 2) Substitutions: See Section 01 6000 Product Requirements.

## 2.03 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Use for vertical surfaces, unless otherwise indicated.
  - 2. Thickness:
    - a. Vertical Surfaces: 5/8 inch.

### 2.04 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness to fill stud cavity.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
  - 1. Products:
    - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
    - b. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: www.stifirestop.com/#sle.
    - c. Substitutions: See Section 01 6000 Product Requirements.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

- 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners.
- 2. Joint Compound: Drying type, vinyl-based, ready-mixed.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

### PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

### 3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C1007AISI S220 and manufacturer's instructions.
- B. Studs: Space studs at 16 inches on center.
  - Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 2 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
  - 1. Orientation: Horizontal.

#### 3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### 3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
  - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Installation on Metal Framing: Use screws for attachment of gypsum board.

# 3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### 3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

## 3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

### SECTION 09 5100 - ACOUSTICAL CEILINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

#### 1.02 REFERENCE STANDARDS

- A. ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM C635/C635M Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2022.
- D. ASTM C636/C636M Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2019.
- E. ASTM E580/E580M Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2022.
- F. ASTM E1264 Standard Classification for Acoustical Ceiling Products 2023.

### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 Product Requirements, for additional provisions.
  - Extra Acoustical Units: .

## PART 2 PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category C and complying with the following:
  - 1. Local authorities having jurisdiction.

#### 2.02 ACOUSTICAL UNITS

- A. Acoustical Tiles: Mineral fiber with membrane-faced overlay, with the following characteristics:
  - 1. Classification: ASTM E1264 Type IV.
  - 2. Size: 24 by 24 inches.
  - 3. Thickness: 3/4 inch.
  - 4. Tile Edge: Square.
  - 5. Suspension System: Exposed grid.
  - 6. Products:
    - a. As indicated in Drawing Finish Legend.
    - b. Substitutions: See Section 01 6000 Product Requirements.

## 2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- B. Metal Suspension Systems General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
  - 1. Materials:
    - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- C. Exposed Suspension System: Hot-dipped galvanized steel grid with steel cap.
  - Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
  - 2. Profile: Tee; 15/16 inch face width.
  - 3. Finish: Baked enamel.
  - 4. Color: White.

#### 2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.

### PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

### 3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

### 3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - Use longest practical lengths.
- D. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch clearance between grid ends and wall.
- E. 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.

- F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- H. Do not eccentrically load system or induce rotation of runners.

## 3.04 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. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.

# 3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### SECTION 09 6500 - RESILIENT FLOORING

## PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Resilient base.
- D. Installation accessories.

#### 1.02 REFERENCE STANDARDS

- A. ASTM F1344 Standard Specification for Rubber Floor Tile 2021a.
- B. ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing 2021a.
- C. ASTM F1861 Standard Specification for Resilient Wall Base 2021.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples illustrating color and pattern for each resilient floor product specified.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

## 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Protect roll materials from damage by storing on end.
- D. Do not double stack pallets.

### PART 2 PRODUCTS

#### 2.01 SHEET FLOORING

- A. Rubber Sheet Flooring: 100 percent rubber composition, color and pattern through total thickness.
  - Manufacturers:
    - a. As indicated in Drawings Finish Legend.
    - b. Substitutions: Not permitted.
  - 2. Minimum Requirements: Comply with ASTM F1859, Type 1, without backing.
  - 3. Thickness: 0.08 inch minimum.
  - 4. Seams: Heat welded.
  - 5. Color: As indicated in Drawings Finish Legend.
- B. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

### 2.02 TILE FLOORING

- A. Rubber Tile: Homogeneous rubber compound.
  - 1. Manufacturers:
    - a. As indicated in Drawings Finish Legend.
    - b. Substitutions: Not permitted.
  - 2. Minimum Requirements: Comply with ASTM F1344, of Class corresponding to type specified.
  - 3. Size: As indicated on drawings nominal.
  - 4. Total Thickness: 0.14 inch.
  - 5. Pattern: As indicated in Drawings Finish Legend.
  - 6. Color: As indicated in Drawings Finish Legend.

### 2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS, rubber, vulcanized thermoset; style as scheduled.
  - 1. Manufacturers:
    - a. As indicated in Drawings Finish Legend.
    - b. Substitutions: Not permitted.
  - 2. Height: 4 inches.
  - 3. Thickness: 0.125 inch.
  - 4. Finish: Satin.
  - 5. Length: Roll.
  - 6. Color: As indicated in Drawing Finish Legend.
  - 7. Accessories: Premolded external corners and internal corners.

### 2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.
- D. Clean substrate.

### 3.02 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
  - 1. Spread only enough adhesive to permit installation of materials before initial set.
  - 2. Fit joints and butt seams tightly.
  - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

### 3.03 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seal seams by heat welding where indicated.

#### 3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install square tile to pattern as indicated on drawings. Allow minimum 1/2 full size tile width at room or area perimeter.

### 3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

## 3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

### 3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

### SECTION 09 6813 - TILE CARPETING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

#### 1.02 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color for each carpet color selected.
- D. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

#### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Tile Carpeting:
  - 1. As indicated in Drawings Finish Legend.
  - 2. Substitutions: Not permitted.

#### 2.02 MATERIALS

- A. Tile Carpeting: Tufted, manufactured in one color dye lot.
  - 1. Tile Size and Thickness: As indicated in Drawings Finish Legend.
  - 2. Color: As indicated in Drawings Finish Legend.

### 2.03 ACCESSORIES

- A. Edge Strips: As indicated in Drawings Finish Legend, color as selected by Architect.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

#### PART 3 EXECUTION

## 3.01 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

## 3.02 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in ashlar pattern, with pile direction parallel to next unit, set parallel to building lines
- F. Locate change of color or pattern between rooms under door centerline.

- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

# 3.03 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

#### SECTION 09 9123 - INTERIOR PAINTING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Prime surfaces to receive wall coverings.
  - Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. In finished areas, paint shop-primed items.
    - c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    - d. Paint dampers exposed behind louvers, grilles, to match face panels.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
  - 6. Floors, unless specifically indicated.
  - 7. Ceramic and other tiles.
  - 8. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
  - 9. Glass.
  - 10. Acoustical materials, unless specifically indicated.
  - 11. Concealed pipes, ducts, and conduits.

## 1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.
- B. Specular Gloss: Ranges determined by Master Painters Institute (MPI). Sheen is specified to establish required gloss range.

	Sheen	Geometry/Deg.	Gloss Range	MPI Gloss Level
1.	Flat	60	Below 5	1
2.	Flat, light sheen	60	Max 10	2
3.	Eggshell	60	10 to 25	3
4.	Satin	60	20 to 35	4
5.	Semi-gloss	60	35 to 70	5
6.	Gloss	60	70 to 85	6

C. Finish (gloss level) of all painted surfaces shall be as specified herein or as noted on Finish Schedule.

### 1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- C. ASTM D4442 Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- D. MPI (APL) Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- E. MPI (APSM) Master Painters Institute Architectural Painting Specification Manual Current Edition.
- F. SCAQMD 1113 Architectural Coatings 1977, with Amendment (2016).
- G. SSPC-SP 1 Solvent Cleaning 2015, with Editorial Revision (2016).
- H. SSPC-SP 2 Hand Tool Cleaning 2018.
- I. SSPC-SP 6 Commercial Blast Cleaning 2007.
- J. SSPC-SP 13 Surface Preparation of Concrete 2018.

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd ename!").
  - 2. MPI product number (e.g., MPI #47).
  - Cross-reference to specified paint system products to be used in project; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gal of each color; from the same product run, store where directed.

3. Label each container with color in addition to the manufacturer's label.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: 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.
- C. Paint Materials: Store 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.

#### 1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc measured mid-height at substrate surface.

### PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Benjamin Moore & Co: www.benjaminmoore.com.
  - 2. PPG Paints: www.ppgpaints.com/#sle.
  - 3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 Product Requirements.

## 2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
  - Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
  - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

- 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
- 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
    - b. SCAQMD 1113 Rule.
    - c. Architectural coatings VOC limits of 50 g/L, maximum, per MPI Green Performance Standard GPS-2.
  - Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Chemical Components: Provide coatings that comply with MPI Green Performance Standard GPS-2.
- D. Colors: As indicated on drawings.
  - 1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
  - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

## 2.03 PAINT SYSTEMS - INTERIOR

- A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
  - Two top coats and one coat primer.
  - 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex, MPI Extreme Green Standard; MPI #143, 144, or 147.
  - 3. Top Coat Sheen:
    - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
    - b. Velvet: MPI gloss level 2; use this sheen for wall surfaces.
    - c. Semi-Gloss: MPI gloss level 5; use this sheen for wood trim exposed to foot traffic and wood window frames, sills, and casings.
  - 4. Primer: As specified under "PRIMERS" below.
- B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
  - Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
  - 2. Two top coats and one coat primer.
  - 3. Top Coat(s): Interior Light Industrial Coating, Water Based, MPI Extreme Green Standard; MPI #153.
  - 4. Top Coat Sheen:
    - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
  - 5. Primer: As specified under "PRIMERS" below.

## 2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

- 1. Alkali Resistant Water Based Primer, MPI Extreme Green Standard; MPI #3.
- Interior Institutional Low Odor/VOC Primer Sealer, MPI Extreme Green Standard; MPI #149.
- Interior Rust-Inhibitive Water Based Primer, MPI Extreme Green Standard; MPI #107.
- 4. Stain Blocking Primer, Water Based, MPI Extreme Green Standard; MPI #137.
- Latex Primer for Interior Wood; MPI #39.
- 6. Bonding Primer, Water Based, MPI Extreme Green Standard; MPI #17.

### 2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

#### PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  - 1. Gypsum Wallboard: 12 percent.
  - 2. Plaster and Stucco: 12 percent.
  - 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  - 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

### 3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Concrete:
  - Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  - Prepare surface as recommended by top coat manufacturer and according to SSPC-SP
     13
- F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- G. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high-alkali surfaces.
- H. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

- Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Prepare surface according to SSPC-SP 2.

### K. Ferrous Metal:

- 1. Solvent clean according to SSPC-SP 1.
- Shop-Primed 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.
- Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.
- L. Wood Surfaces to Receive Opaque 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. Back prime concealed surfaces before installation.
- M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

#### 3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

## 3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

### SECTION 10 1100 - VISUAL DISPLAY UNITS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Porcelain enamel steel markerboards.
- B. Tackboards.

### 1.02 REFERENCE STANDARDS

- A. ANSI A208.1 American National Standard for Particleboard 2022.
- B. ASTM A424/A424M Standard Specification for Steel, Sheet, for Porcelain Enameling 2018.
- C. ASTM C208 Standard Specification for Cellulosic Fiber Insulating Board 2022.

# 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of markerboard, tackboard, tackboard surface covering, and trim.
- E. Maintenance Data: Include data on regular cleaning, stain removal.

### PART 2 PRODUCTS

### 2.01 VISUAL DISPLAY UNITS

- A. Markerboards (Writing): Porcelain enamel on steel, laminated to core.
  - 1. Color: White.
  - 2. Finish: Gloss.
  - 3. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch.
  - 4. Core: Particleboard, 1/2 inch thick, laminated to face sheet.
  - 5. Backing: Aluminum sheet, laminated to core.
  - Size: As indicated on drawings.
  - 7. Frame: Extruded aluminum, with concealed fasteners.
  - Frame Finish: Anodized, natural.
  - 9. Accessories: Provide marker tray and map rail.
  - 10. Products:
    - a. Egan Visual Corporation; Egan Visual WhiteBoards: www.egan.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.
- B. Tackboards: Composition cork.
  - 1. Cork Thickness: 1/4 inch.
  - 2. Color: As selected from manufacturer's full range.
  - 3. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
  - Size: As indicated on drawings.
  - 5. Frame: Extruded aluminum, with concealed fasteners.
  - 6. Frame Finish: Anodized, natural.
  - 7. Products:
    - a. Egan Visual Corporation; Egan Visual TackBoards: www.egan.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.

### 2.02 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- C. Fiber Board: ASTM C208, cellulosic fiber board.
- D. Aluminum Sheet Backing: 27 gauge, 0.014 inch thick.
- E. Adhesives: Type used by manufacturer.

#### 2.03 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.
- B. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- C. Mounting Brackets: Concealed.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.
- C. Verify flat wall surface for frameless adhesive-applied boards.

## 3.02 PREPARATION

- A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.
- B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

## 3.03 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with top of marker tray at 30 inches above finished floor.
- C. Secure units level and plumb.
- D. Carefully cut holes in boards for thermostats and wall switches.
- E. Install tackable wall panels in accordance with manufacturer's recommendations on specified substrates with concealed attachments.
  - 1. Fabricate re-wrapped edges where partial panels about each other, or adjacent surfaces or trim.
  - Re-wrap top, bottom or side edges for cutting panels around door or window openings, abutting trim, protruding objects, and at other openings, including x-cut at receptacles, light switches, and other openings.
    - a. Wrap minimum 2 inches around back of panel.

b. Carefully cut fiber board, leaving vinyl wallcovering intact. Wrap wallcovering tightly around edge of board and adhere continuously around back of panel with manufacturer's recommended vinyl wallcovering adhesive.

# 3.04 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

### SECTION 10 1400 - SIGNAGE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Room and door signs.

#### 1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards 2010 ADA Standards for Accessible Design 2010.
- C. ICC A117.1 Accessible and Usable Buildings and Facilities 2017.

# 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Manufacturer's Qualification Statement.

# 1.04 QUALITY ASSURANCE

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

## 1.05 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Flat Signs:
  - 1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
  - FASTSIGNS: www.fastsigns.com/#sle.
  - 3. Inpro: www.inprocorp.com/#sle.
  - 4. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.
  - 5. Seton Identification Products: www.seton.com/aec/#sle.
  - 6. Navitor Specialty Products: www.navitorsp.com.
  - 7. Substitutions: See Section 01 6000 Product Requirements.

### 2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
  - 1. Sign Type: Flat signs with sand blasted plastic laminate panel media as specified.
  - 2. Character Height: 1 inch.
  - 3. Sign Height: 1-1/2 inches greater than text body height, unless otherwise indicated.

#### 2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
  - 1. Edges: Square.
  - 2. Corners: Square.
  - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
  - 1. Character Font: Helvetica, Arial, or other sans serif font.
  - 2. Character Case: Upper case only.
  - 3. Background Color: As scheduled.
  - 4. Character Color: Contrasting color.

#### 2.04 TACTILE SIGNAGE MEDIA

- A. Sand Blasted Panels: Laminated colored plastic; sandblasted through face to expose core as background color:
  - 1. Total Thickness: 1/8 inch.

### 2.05 NON-TACTILE SIGNAGE MEDIA

- A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
  - Sign Color: Clear.
  - 2. Total Thickness: 1/8 inch.

# 2.06 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

## SECTION 10 2123 - CUBICLE CURTAINS AND TRACK

#### PART 1 GENERAL

### 1.01 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for curtain fabric characteristics.

#### PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Cubicle Track and Curtains:
  - 1. Track: Construction Specialties, Inc.
  - 2. Curtains: Hush, Inc.
  - 3. Substitutions: See Section 01 6000 Product Requirements.

#### 2.02 TRACKS AND TRACK COMPONENTS

- A. Tracks: Extruded aluminum sections; one piece per track run.
  - 1. Profile: Channel.
  - 2. Mounting: Surface.
  - 3. Track End Stop: To fit track section.
  - 4. Finish on Exposed Surfaces: Clear anodized.
- B. Curtain Carriers: Nylon rollers, size and type compatible with track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal.
- C. Installation Accessories: Types required for specified mounting method and substrate conditions.

## 2.03 CURTAINS

### A. Cubicle Curtains:

- 1. Material: Close weave polyester; anti-bacterial, self deodorizing, sanitized, and preshrunk.
- 2. Color/Pattern: Hush C Select, Sea Grass pattern. At Sim Labs 1 and 2 provide Tide Water #03 color. At Sim Labs 3 and 4 provide Bayshore Blue #06 color.
- 3. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, manufacturer's standard color.
- 4. Attachment of Curtain Fabric to Open Mesh Cloth: Manufacturer's zipper seam.

### B. Curtain Fabrication:

- 1. Width of curtain to be 10 percent wider than track length.
- 2. Length of curtain to end 15 inches above finished floor.
- 3. Include open mesh cloth at top 20 inches of curtain for room air circulation.
- 4. Curtain Heading: Fabric band matching curtain panel with metal grommet holes for carriers spaced 6 inches on center.
- 5. Seams and Hems: Manufacturer's standard fabrication method for securely sewn and finished seams and hems.

### PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that surfaces and supports above ceiling are ready to receive work of this Section.

# 3.02 INSTALLATION

- A. Install curtain track to be secure, rigid, and true to ceiling line.
- B. Secure track to ceiling system.
- C. Install end cap and stop device.
- D. Install curtains on carriers ensuring smooth operation.

#### SECTION 12 2400 - WINDOW SHADES

## PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Interior manual roller shades.

### 1.02 REFERENCE STANDARDS

- A. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2023, with Errata.
- B. WCMA A100.1 Standard for Safety of Window Covering Products 2022.

### PART 2 PRODUCTS

### 2.01 ROLLER SHADES

#### A. General:

- 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
- 2. Provide shade system that operates smoothly when shades are raised or lowered.
- B. Roller Shades Basis of Design: MechoShade Systems LLC; Mecho/5 System;

www.mechoshade.com/#sle.

- 1. Description: Single roller, manually operated fabric window shades.
- 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
- Roller Tubes:
  - a. Material: Extruded aluminum.
  - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
  - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
  - d. Capable of being removed and reinstalled without affecting roller shade limit adjustments.
- 4. Hembars: Designed to maintain bottom of shade straight and flat.
  - a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
- 5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
  - a. Provide a permanently lubricated brake assembly mounted on an oil-impregnated hub with wrapped spring clutch.
  - b. Brake must withstand minimum pull force of 50 lb in the stopped position.
  - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
- 6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
  - a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
- 7. Accessories:
  - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; finish to match existing windows.
    - 1) Profile: Square.
  - b. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

### 2.02 SHADE FABRIC

- A. Fabric: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
  - Manufacturers:
    - MechoShade Systems LLC; Soho 1600 Series (3% open): www.mechoshade.com/#sle.
    - b. Substitutions: See Section 01 6000 Product Requirements.
  - Performance Requirements:
    - a. Flammability: Pass NFPA 701 large and small tests.
  - . Color: As indicated in Drawings Finish Legend.

### 2.03 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
  - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
  - 2. Horizontal Dimensions Outside Mounting: Cover window frames, trim, and casings completely.

### PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. Start of installation shall be considered acceptance of substrates.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

## 3.03 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

### SECTION 12 3600 - COUNTERTOPS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

#### 1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) North American Architectural Woodwork Standards 2021, with Errata.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

#### PART 2 PRODUCTS

## 2.01 COUNTERTOPS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Composite Countertops: Solid paper and resin composite over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - Exposed Edge Treatment: Knife edge.
  - Manufacturers:
    - a. As indicated in Drawings Finish Legend.
    - b. Substitutions: Not permitted.
  - 4. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
  - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

### 2.02 ACCESSORIES

A. Fixed Top-Mounted Countertop Support Brackets:

## 2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.

- 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
- 2. Height: 4 inches, unless otherwise indicated.

# PART 3 EXECUTION

## 3.01 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

## 3.02 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

### 3.03 CLEANING

A. Clean countertops surfaces thoroughly.

#### **SECTION 21 1000 - FIRE SUPPRESSION SPRINKLER SYSTEMS**

#### **PART 1 - GENERAL**

### 1.01 SUMMARY

- A. Work Included:
  - 1. Relocation of existing sprinkler heads and revisions to existing piping for new room layout.
- B. This is a contractor designed system. Contact Authority Having Jurisdiction prior to bid to verify fire system requirements. Provide design compliant with codes as interpreted by AHJ.
- C. Coordinate with Owner the location and type of tamper, flow and pressure switches and fire alarm system.
- D. Provide electrical connections and wiring as required for a complete and operable system. Includes but is not limited to bells, air compressors, sump pumps, fire pumps, jockey pumps and pump controllers.

## 1.02 SUBMITTALS

A. Submit design drawings and calculations to Architect for review and upon Architect's approval submit to Authority Having Jurisdiction for permit.

## 1.03 QUALITY ASSURANCE

A. Quality assurance as required by Division 01, General Requirements.

## 1.04 WARRANTY

A. Warranty of materials and workmanship as required by Division 01, General Requirements.

#### 1.05 SYSTEM DESCRIPTION

- A. Provide coverage for new room layout. Field verify field conditions. Provide protection features in accordance with applicable codes and interpretations by AHJ.
- B. Design Parameters:
  - 1. Building Areas: Areas where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.
    - a. Occupancy Classification: Light.
  - 2. Building Areas: Areas where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8-feet, and fires with moderate rates of heat release are expected.
    - a. Occupancy Classification: Ordinary Group 1.
  - 3. Building Areas: Areas where the quantity and combustibility of contents are moderate to high, stockpiles of contents with moderate rates of heat re-lease do not exceed 12-feet and stockpiles of contents with high rates of heat release do not exceed 8-feet.
    - a. Occupancy Classification: Ordinary Group 2.
  - 4. Design parameters above are NFPA 13 minimums. Provide increased design densities, design areas and hose allowances to meet requirements of AHJ.
- C. Sprinkler system design to include a 10 percent pressure and flow cushion between system demand point and available water supplies.
- D. Extend hydraulic calculations from hydraulically most remote design area back to location of pressure hydrant of flow test or effective point of water supply where characteristics of water supply are known.

## PART 2 - PRODUCTS - NOT USED

## **PART 3 - EXECUTION**

# 3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install per manufacturer's requirements and recommendations.

## 3.02 SPRINKLERS

- A. Center sprinklers in center or quarter points of suspended ceiling tile.
- B. Align sprinklers with architectural column lines, lighting, diffusers and other ceiling features. In unfinished ceilings, route piping to minimize visual impact. Sprinklers and piping not so aligned are to be removed and replaced at no additional cost to Owner.

## **SECTION 22 0523**

## **GENERAL-DUTY VALVES FOR PLUMBING PIPING**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Ball valves.
- B. Check valves.
- C. Flow limiting valves.
- D. Domestic Hot Water Balancing Valves

## 1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 Construction Waste Management and Disposal
- B. Section 01 91 13 General Commissioning Requirements
- C. Section 22 0553 Identification for Plumbing Piping and Equipment.
- D. Section 22 0719 Plumbing Piping Insulation.
- E. Section 22 1005 Plumbing Piping.

## 1.03 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. TFE: Tetrafluoroethylene.
- I. WOG: Water, oil, and gas.

# 1.04 REFERENCE STANDARDS

- A. API STD 594 Check Valves: Flanged, Lug, Wafer, and Butt-Welding 2022.
- B. ASME B1.20.1 Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
- C. ASME B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
- D. ASME B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

- E. ASME B16.10 Face-to-Face and End-to-End Dimensions of Valves 2022.
- F. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- G. ASME B16.34 Valves Flanged, Threaded, and Welding End 2020.
- H. ASME B31.9 Building Services Piping 2020.
- I. MSS SP-80 Bronze Gate, Globe, Angle, and Check Valves 2019.
- J. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
   2010, with Errata .
- K. NSF 61 Drinking Water System Components Health Effects 2022, with Errata.
- L. NSF 372 Drinking Water System Components Lead Content 2022.

#### 1.05 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

## 1.06 QUALITY ASSURANCE

- A. Manufacturer:
  - 1. Obtain valves for each valve type from single manufacturer.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
  - 2. Protect valve parts exposed to piped medium against rust and corrosion.
  - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
  - 4. Secure check valves in either the closed position or open position.
- B. Use the following precautions during storage:
  - Maintain valve end protection and protect flanges and specialties from dirt.
    - a. Provide temporary inlet and outlet caps.
    - b. Maintain caps in place until installation.
  - 2. Store valves in shipping containers and maintain in place until installation.
    - a. Store valves indoors in dry environment.
    - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

#### **PART 2 PRODUCTS**

#### 2.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- C. Provide the following valves for the applications if not indicated on drawings:
  - Shutoff: Ball valve.
- D. Low Pressure, Compressed Air Valves 150 psi or Less:
  - 1. 2 inch and Smaller:
    - a. Bronze: Provide with solder-joint ends.
    - b. Ball: Two piece, full port, brass with brass trim.
- E. Domestic, Hot and Cold Water Valves:
  - 1. 2 inch and Smaller:
    - a. Bronze: Provide with solder-joint ends.
    - b. Ball: Two piece, full port, bronze with bronze trim.
    - c. Bronze Swing Check: Class 125, bronze disc.

## 2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Insulated Piping Valves: With 2 inch stem extensions and the following features:
  - Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
  - 2. Memory Stops: Fully adjustable after insulation is installed.
- D. Valve-End Connections:
  - 1. Threaded End Valves: ASME B1.20.1.
  - Solder Joint Connections: ASME B16.18.
- E. General ASME Compliance:
  - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
  - 2. Solder-joint Connections: ASME B16.18.
  - 3. Building Services Piping Valves: ASME B31.9.
- F. Potable Water Use:
  - 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
  - Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

#### 2.03 BRONZE, BALL VALVES

A. General:

- 1. Fabricate from dezincification resistant material.
- 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Two Piece, Full Port with Bronze Trim (lead free):
  - 1. Comply with MSS SP-110.
  - 2. WSP Rating: 150 psi.
  - 3. WOG Rating: 600 psi.
  - Body: Forged bronze.
  - 5. Ends Connections: Pipe thread or solder.
  - 6. Seats: PTFE.
  - 7. Stem: Bronze, blowout proof.
  - 8. Ball: Chrome plated brass.
  - 9. Manufacturers:
    - a. Apollo Valves: www.apollovalves.com/#sle.
    - b. Hammond.
    - c. Conbraco
    - d. Milwaukee

## 2.04 BRONZE, SWING CHECK VALVES

- A. General:
  - 1. Fabricate from dezincification resistant material.
  - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig (1380 kPa).
  - 1. Pressure and Temperature Rating: MSS SP-80, Type 3.
  - 2. Design: Y-pattern, horizontal or vertical flow.
  - 3. WOG Rating: 200 psi.
  - 4. Body: Bronze, ASTM B62.
  - 5. Ends: Soldered as indicated.
  - 6. Disc: Bronze.
  - 7. Manufacturers:
    - a. Apollo Valves: www.apollovalves.com/#sle.
    - b. Hammond.
    - c. Conbraco
    - d. Milwaukee

## 2.05 DOMESTIC HOT WATER BALANCING VALVES

- A. Balancing Valves (Dynamic)
  - 1. Manufacturer: Caleffi FlowCal
  - 2. Lead free brass body, 304 stainless steel ball, solder connections, glass & carbon filled TFE seat rings, EPDM stem O ring, brass readout valves with EPT check valves.
  - 3. Manufacturers: B&G Circuit Setter Plus

#### PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

## 3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- D. Install check valves where necessary to maintain direction of flow as follows:
  - 1. Swing Check: Install horizontal maintaining hinge pin level.

## **SECTION 22 0529**

## HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Strut systems for pipe or equipment support.
- B. Beam clamps.
- C. Pipe hangers.
- D. Pipe supports, guides, shields, and saddles.
- E. Anchors and fasteners.

## 1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 Construction Waste Management and Disposal
- B. Section 01 81 19 Indoor Air Quality Requirements
- C. Section 01 91 13 General Commissioning Requirements
- D. Section 22 0548 Vibration and Seismic Controls for Plumbing Piping and Equipment.

## 1.03 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 2023.
- C. ASTM A181/A181M Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2023.
- D. ASTM A36/A36M Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- G. ASTM A395/A395M Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).

- H. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- J. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.
- K. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection,
   Application, and Installation 2018, with Amendment (2019).
- NFPA 101 Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction,
   Including All Applicable Amendments and Supplements.
- M. UL (DIR) Online Certifications Directory Current Edition.
- N. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

## 1.04 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 Contract Documents. Obtain direction before proceeding with work.

## 1.05 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

#### 1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

#### **PART 2 PRODUCTS**

#### 2.01 GENERAL REQUIREMENTS

- A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
- B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
- C. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- D. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

#### 2.02 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

- A. Strut Channels:
  - Manufacturers:
    - a. ABB Installation Products: electrification.us.abb.com/#sle.
    - b. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
    - ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
    - Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- B. Hanger Rods:
  - 1. Threaded zinc-plated steel unless otherwise indicated.
  - 2. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Piping up to 1 inch: 1/4 inch diameter.
    - b. Piping larger than 1 inch: 3/8 inch diameter.
    - c. Trapeze Support for Multiple Pipes: 3/8 inch in length.
- C. Channel Nuts:
  - 1. Manufacturers:
    - a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
    - b. Unistrut, a brand of Atkore International, Inc. www.unistrut.com/#sle.
  - Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

#### 2.03 BEAM CLAMPS

- A. Manufacturers:
  - 1. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
  - 2. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.

- B. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- C. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

## 2.04 PIPE HANGERS

- A. J-Hangers, Adjustable:
  - Manufacturers:
    - a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
    - b. FNW; 7025: www.fnw.com/#sle.
    - c. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
  - MSS SP-58 type 5, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
- B. Clevis Hangers, Adjustable:
  - 1. Manufacturers:
    - a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
    - b. FNW; 7005: www.fnw.com/#sle.
    - c. nVent Caddy, a brand of nVent: www.erico.com/#sle.
  - Light-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
  - 3. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

## 2.05 PIPE CLAMPS

- A. Riser Clamps:
  - Manufacturers:
    - a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
    - b. FNW; 7020: www.fnw.com/#sle.
    - c. nVent Caddy, a brand of nVent: www.erico.com/#sle.
    - 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
    - 3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
    - 4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

# 2.06 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

- A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- B. Pipe Supports:
  - 1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

## 2.07 ANCHORS AND FASTENERS

- A. Manufacturers Mechanical Anchors:
  - 1. Hilti, Inc: www.us.hilti.com/#sle.

- 2. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
- 3. Powers Fasteners, Inc: www.powers.com/#sle.
- 4. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
- B. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- C. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- D. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- E. Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
- F. Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
  - 1. Channel Material: Use galvanized steel.
  - 2. Manufacturer: Same as manufacturer of metal strut channel framing system.
- G. Concrete Inserts:
  - Manufacturers:
    - a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
    - HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
    - c. nVent Caddy, a brand of nVent: www.erico.com/#sle.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- 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.

#### 3.02 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. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- E. Secure fasteners according to manufacturer's recommended torque settings.
- F. Remove temporary supports.

## 3.03 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.

## **SECTION 22 0553**

## **IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

# 1.01 SECTION INCLUDES

- A. Tags.
- B. Pipe markers.
- C. Ceiling tacks.

#### 1.02 REFERENCE STANDARDS

- A. ASME A13.1 Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 Standard Specification for Laminated Thermosetting Materials 2017.

## 1.03 SUBMITTALS

- A. See Section 01 33 for submittal procedures.
- B. Schedules:
  - 1. Submit plumbing component identification schedule listing equipment, piping, and valves.
  - 2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
  - 3. Valve Data Format: Include id-number, location, function, and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves.

### **PART 2 PRODUCTS**

## 2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Tags:
  - 1. Piping: 4 inch diameter and smaller.
  - Manual operated and automated control valves.
  - 3. Ceiling tacks placed on lay-in ceiling surface to reference plumbing components.
- B. Pipe Markers: 3/4 inch diameter and higher.

#### 2.02 TAGS

- A. Manufacturers:
  - 1. Brady Corporation: www.bradycorp.com/#sle.
  - 2. Seton Identification Products: www.seton.com/#sle.
  - Hanply.
- B. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three

lines of text. Minimum tag size 1-1/2 inch in diameter.

C. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.

## 2.03 PIPE MARKERS

- A. Manufacturers:
  - 1. Brady Corporation: www.bradycorp.com/#sle.
  - 2. Seton Identification Products: www.seton.com/#sle.
- B. Comply with ASME A13.1.
- C. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- D. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

#### 2.04 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

## **PART 3 EXECUTION**

#### 3.01 PREPARATION

A. Degrease and clean surfaces to receive identification products.

### 3.02 INSTALLATION

- A. Label all piping with system description and directional flow arrows.
- B. Label all valves with ID numbers and service function.
- C. Label all piping every 25 feet and within 5 feet of tees, elbows and wall or floor penetrations.
- D. Label at first incoming fixture.
- E. Clearly define valves within zoned systems.
- F. Label at all entries into new spaces and/or through walls.
- G. Covering or painting of any sign/label requires replacement.
- H. Label ceilings or ceiling grid (not the tile) at key access points, valves, and equipment with a clear adhesive label and bold black lettering with ID info.
- I. Install tags in clear view and align with axis of piping
- J. Install plastic pipe markers in accordance with manufacturer's instructions.
- K. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.

L. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

## **SECTION 22 0719**

## PLUMBING PIPING INSULATION

## **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Glass fiber insulation.
- C. Jacketing and accessories.

### 1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 Construction Waste Management and Disposal
- B. Section 01 81 19 Indoor Air Quality Requirements
- C. Section 01 91 13 General Commissioning Requirements
- D. Section 07 8400 Firestopping.
- E. Section 22 1005 Plumbing Piping: Placement of hangers and hanger inserts.

## 1.03 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/B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- C. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).
- D. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
- E. ASTM C449 Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement 2007 (Reapproved 2019).
- F. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- G. ASTM C533 Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation2017 (Reapproved 2023).

- H. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- I. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation 2022a.
- J. ASTM C585 Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing 2022.
- K. ASTM D1056 Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber 2020.
- ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
   2023b.
- M. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- N. ASTM E96/E96M Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- O. SAE AMS3779 Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth 2016b.
- P. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

## 1.04 SUBMITTALS

- A. See Section 01 33 00 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 that ensure acceptable workmanship and installation standards will be achieved.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

# **PART 2 PRODUCTS**

## 2.01 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.

#### 2.02 GLASS FIBER INSULATION

- A. Manufacturers:
  - CertainTeed Corporation: www.certainteed.com/#sle.
  - 2. Johns Manville Corporation: www.jm.com/#sle.
  - 3. Knauf Insulation: Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
  - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com/#sle.
  - 5. Owens Corning Corporation; VaporWick Pipe Insulation: www.ocbuildingspec.com/#sle.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
  - Maximum Service Temperature: 850 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.

## 2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
  - 1. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
  - K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM

C534/C534M Grade 1; 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.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

#### 2.04 JACKETING AND ACCESSORIES

- A. PVC Plastic Jacket:
  - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

## 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (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, pump bodies, and expansion joints.
- E. 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. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 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.
- F. 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.
  - 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.
- G. Inserts and Shields:
  - 1. Application: Piping 1-1/2 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.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 8400.

## **SECTION 22 1005**

## **PLUMBING PIPING**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Sanitary waste piping, above grade.
- B. Domestic water piping, above grade.
- C. Vacuum and compressed air piping, above grade.

### 1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 Construction Waste Management and Disposal
- B. Section 01 81 19 Indoor Air Quality Requirements
- C. Section 01 91 13 General Commissioning Requirements
- D. Section 22 0516 Expansion Fittings and Loops for Plumbing Piping.
- E. Section 22 0553 Identification for Plumbing Piping and Equipment.
- F. Section 22 0719 Plumbing Piping Insulation.

## 1.03 REFERENCE STANDARDS

- A. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- B. ASME B31.9 Building Services Piping 2020.
- C. ASTM B32 Standard Specification for Solder Metal 2020.
- D. ASTM B75/B75M Standard Specification for Seamless Copper Tube 2020.
- E. ASTM B88 Standard Specification for Seamless Copper Water Tube 2022.
- F. ASTM B302 Standard Specification for Threadless Copper Pipe, Standard Sizes 2017.
- G. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- H. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.
- J. ASTM C1277 Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings 2020.

- K. CISPI 301 Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2021.
- L. 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 2020.
- M. NSF 372 Drinking Water System Components Lead Content 2022.
- N. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

- A. See Section 01 33 00 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.

## 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

## **PART 2 PRODUCTS**

## 2.01 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.

## 2.02 SANITARY WASTE 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.

## 2.03 DOMESTIC 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.

#### 2.04 VACUUM AND COMPRESSED AIR PIPING. ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
  - 1. Fittings: ASME B16.26, cast bronze.
  - Joints: Flared.
- B. Copper Tube: Listed, ASTM B88 (ASTM B88M), Type K (A), annealed.
  - 1. Fittings: ASME B16.18 cast copper or ASME B16.22 wrought copper.
  - 2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.

## 2.05 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 inch and Under:
  - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
  - Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Sizes Over 1 inch:
  - Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. No-Hub Couplings:
  - 1. Testing: In accordance with ASTM C1277 and CISPI 310.
  - 2. Gasket Material: Neoprene complying with ASTM C564.
  - 3. Band Material: Stainless steel.
  - 4. Eyelet Material: Stainless steel.
  - 5. Manufacturers:
    - a. Ideal Clamp Products, Inc; Standard: www.idealtridon.com//#sle.
    - b. MIFAB, Inc; MI-QHUB: www.mifab.com/#sle.
    - c. Husky.

## **PART 3 EXECUTION**

## 3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

#### 3.02 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. See Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- J. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- K. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- L. Install water piping to ASME B31.9.
- M. 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.
- N. Sleeve pipes passing through partitions, walls, and floors.
- O. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

## 3.03 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 ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Provide flow controls in water recirculating systems where indicated.

#### 3.04 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

#### 3.05 FIELD TESTS AND INSPECTIONS

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B. Domestic Water Systems:
  - 1. Perform hydrostatic testing for leakage prior to system disinfection.
  - 2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
  - General:
    - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.
- C. Vacuum and Compressed Air Distribution Systems:
  - 1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
  - 2. General Systems:
    - a. Inject a minimum of 10 psi of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
    - b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound.
- D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

#### 3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 0110.58.
- B. Prior to starting work, verify system is complete, flushed, and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. 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.

## **SECTION 22 1006**

## **PLUMBING PIPING SPECIALTIES**

## **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Refrigerator valve and recessed box.
- E. Backflow preventers.
- F. Double check valve assemblies.
- G. Water hammer arrestors.
- H. Mixing valves.
- I. Relief valves.
- J. Air vents.
- K. Electronic trap-seal primers.
- Exterior penetration accessories.

## 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements
- E. Section 22 1005 Plumbing Piping.
- F. Section 22 3000 Plumbing Equipment.
- G. Section 22 4000 Plumbing Fixtures.

## 1.03 REFERENCE STANDARDS

- A. ADA Standards 2010 ADA Standards for Accessible Design 2010.
- ASHRAE Std 135 A Data Communication Protocol for Building Automation and Control
   Networks 2020, with Errata and Amendments (2022).
- C. ASSE 1011 Performance Requirements for Hose Connection Vacuum Breakers 2017.

- D. ASSE 1012 Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent 2021.
- E. ASSE 1013 Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
- F. ASSE 1019 Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
- G. ASTM B75/B75M Standard Specification for Seamless Copper Tube 2020.
- H. ASTM B88 Standard Specification for Seamless Copper Water Tube 2022.
- I. NSF 61 Drinking Water System Components Health Effects 2022, with Errata.
- J. NSF 372 Drinking Water System Components Lead Content 2022.
- K. PDI-WH 201 Water Hammer Arresters 2017.

#### 1.04 SUBMITTALS

- A. SUSTAINABLE DESIGN SUBMITTALS
  - 1. General: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products in this section and provide documentation as follows:
    - a. LEED Material Information Form: Submit with each Product Data, a related and completed form with material cost, quantity (as applicable) and a summary of the applicable environmental attributes pertaining to LEED.
    - b. LEED Product Data: Submit product-specific support documentation with relevant LEED information highlighted, for the applicable environmental attributes identified in the LEED Material Information Form. Support documentation may include but is not limited to: product cut sheets, manufacturer literature, letter from manufacture, certification program documentation, Environmental Product Declaration (EPD), or Safety Data Sheets.
- B. See Section 01 33 00 for submittal procedures.
- C. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- D. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- F. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
- G. Operation Data: Indicate frequency of treatment required for interceptors.
- H. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

 Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

## **PART 2 PRODUCTS**

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.

# 2.02 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and
 NSF 372 for maximum lead content.

#### 2.03 DRAINS

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
  - 2. Josam Company: www.josam.com/#sle.
  - 3. MIFAB, Inc; \_\_\_\_: www.mifab.com/#sle.
  - 4. Zurn Industries, LLC: www.zurn.com/#sle.
  - 5. Wade.
  - 6. Sioux Chief
- B. Roof and Overflow Drains:
  - 1. Body: Epoxy coated cast iron with sump.
  - 2. Strainer: Removable cast aluminum or cast iron dome with vandal proof screws.
  - 3. Accessories: Coordinate with roofing type, see architectural plans.:
    - a. Membrane flange and membrane clamp with integral gravel stop.
    - b. Adjustable under deck clamp.
    - c. Roof sump receiver.
    - d. Waterproofing flange.
    - e. Leveling frame.
    - f. Adjustable extension sleeve for roof insulation.
  - 4. Manufacturers:
    - a. Jay R. Smith Manufacturing Company
    - b. MIFAB, Inc
    - c. Zurn Industries, LLC; Z100
    - d. Sioux Chief.
- C. Floor Drains:

- 1. Manufacturers:
  - a. Jay R. Smith Manufacturing Company
  - b. MIFAB, Inc
  - c. Zurn Industries, LLC
  - d. Sioux Chief.
- D. Floor Sink:
  - 1. Cast iron body with dome strainer and seepage flange.

#### 2.04 CLEANOUTS

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company:
  - 2. Josam Company
  - 3. MIFAB, Inc; C1100-R: www.mifab.com/#sle.
  - 4. Zurn Industries, LLC
  - 5. Wade.
  - 6. Sioux Chief
- 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:
  - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, 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:
  - 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: Calked or threaded type. Provide bolted

stack cleanouts on vertical rainwater leaders.

## 2.05 HOSE BIBBS

- A. Manufacturers:
  - 1. Watts Regulator Company
  - 2. Zurn Industries, LLC
  - 3. Woodford.
- B. Interior Hose Bibbs:
  - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome-plated where exposed with handwheel, integral vacuum breaker in compliance with ASSE 1011.
  - In janitorial spaces, provide backflow protected hose bibb for carpet cleaner water connection.

#### 2.06 REFRIGERATOR VALVE AND RECESSED BOX

- A. Box Manufacturers:
  - 1. Viega LLC
  - 2. Sioux Chief.
- B. Description: Plastic preformed rough-in box with brass valves with wheel handle, slip in

finishing cover.

### 2.07 BACKFLOW PREVENTERS

- A. Manufacturers:
  - 1. Watts Regulator Company, a part of Watts Water Technologies
  - Zurn Industries, LLC
- B. Reduced Pressure Backflow Preventer Assembly:
  - ASSE 1013 and NSF 61 compliant reinforced-nylon body and stainless steel springs; two
    independently operating, spring loaded check valves; diaphragm type differential pressure
    relief valve located between check valves; third check valve that opens under back
    pressure in case of diaphragm failure, integral male test fittings, and non-threaded vent
    outlet.

## 2.08 DOUBLE CHECK-VALVE ASSEMBLIES

- A. Manufacturers:
  - 1. Watts Regulator Company, a part of Watts Water Technologies
  - Zurn Industries, LLC
- B. Double Check Valve Assembly:
  - ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.
  - 2. Size: 3/4 to 2 inch, NPS assembly with threaded full port ball valves.

# 2.09 WATER HAMMER ARRESTORS

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company
  - 2. Watts Regulator Company, a part of Watts Water Technologies
  - 3. Precision Plumbing Products.
- B. Water Hammer Arrestors:
  - Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -40 to 212 degrees F and maximum 200 psi working pressure.

# 2.10 MIXING VALVES

- A. Thermostatic Mixing Valves:
  - 1. Manufacturers:
    - a. Leonard Valve Company
    - b. Powers.
    - c. Caleffi

- 2. Valve: Chrome-plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
- 3. High Low, exposed, factory tested and assembled mixing valve assembly consisting of:
  - a. Large and small rough bronze finish thermostatic mixing valves.
  - b. High temperature limit stops.
  - c. Angle check stops.
  - d. Outlet ball valve shutoffs.
  - e. Built-in spring check valve with pressure gauges.
  - f. Thermometer.
  - g. Inlet piping manifolds with unions.
  - h. Unit to control discharge temperature to ±1 percent.
- B. Digitally-Controlled, Thermostatic Master Mixing Valves:
  - 1. Manufacturers:
  - 2. Network Communications Protocol: BACnet over IP complying with ASHRAE Std 135.
  - Accessories:
    - a. Check valve on inlets.
    - b. Volume control shut-off valve on outlet.
    - c. Stem thermometer on outlet.
    - d. 3-way ball valve shut-offs.
    - e. Strainer stop checks on inlets.
  - 4. Cabinet: 16 gauge, 0.0598 inch prime-coated steel, for recessed mounting with keyed lock.

## 2.11 RELIEF VALVES

A. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

#### 2.12 AIR VENTS

A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

### 2.13 ELECTRONIC TRAP-SEAL PRIMERS

A. Description: Enclosed electronic trap seal primer system with timer.

# 2.14 EXTERIOR PENETRATION ACCESSORIES

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
- B. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for piping, cables, and roofing system to be installed; designed to accommodate existing penetrations where applicable.

#### PART 3 EXECUTION

## 3.01 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 approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- F. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks or washing machine outlets.
- H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

## **SECTION 22 4000**

#### **PLUMBING FIXTURES**

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Sinks.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements
- E. Section 22 1005 Plumbing Piping.
- F. Section 22 1006 Plumbing Piping Specialties.

## 1.03 REFERENCE STANDARDS

- A. ADA Standards 2010 ADA Standards for Accessible Design 2010.
- B. ASME A112.18.1 Plumbing Supply Fittings 2018, with Errata.
- C. ASME A112.19.3 Stainless Steel Plumbing Fixtures 2022.
- D. NSF 61 Drinking Water System Components Health Effects 2022, with Errata.
- E. NSF 372 Drinking Water System Components Lead Content 2022.
- F. UL (DIR) Online Certifications Directory Current Edition.

## 1.04 SUBMITTALS

- A. See Section 01 33 00 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. See Section 01 6000 Product Requirements for additional provisions.

# 1.05 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.

## 1.06 WARRANTY

- A. See Section 01 7800 Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

## **PART 2 PRODUCTS**

## 2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and
 NSF 372 for maximum lead content; label pipe and fittings.

#### 2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Comply with UL (DIR) requirements.
- C. Perform work in accordance with local health department regulations.
- Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

#### **2.03 SINKS**

- A. Manufacturers:
  - 1. Elkay.
  - 2. Just
- B. Single Compartment Bowl
  - 1. ASME A112.19.3; 17" by 16" by 6" inch outside dimensions 18 gauge, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
  - 2. Drain: 1-1/2 inch chromed brass.
  - 3. Drain: 3-1/2 inch crumb cup and tailpiece.
- C. Sink Faucets:
  - 1. Manufacturers:
    - Chicago.
    - b. American Standard
  - 2. Two-Handle Faucet:
    - a. Type: Deck-mount, 2-handle, wrist blade operated, gooseneck faucet with mounting plate.
    - b. Spray Type: Full stream spray at 1.5 gpm, maximum.
    - c. ASME A112.18.1, ADA Standards, and NSF 61 compliant assembly.
    - d. Materials: Stainless steel disc valve on brass body with polished chrome finish.

## **PART 3 EXECUTION**

## 3.01 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.

## 3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

## 3.03 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.

## 3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

### 3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

## 3.06 CLEANING

A. Clean plumbing fixtures and equipment.

# 3.07 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.

#### **SECTION 23 0000**

#### MECHANICAL AND PLUMBING BASIC REQUIREMENTS

#### **PART 1 GENERAL**

#### 1.01 RELATED REQUIREMENTS

- A. Specifications including divisions 00 and 01.
- B. Section 01 77 00 Project record documents, operation and maintenance (O&M) data, warranties and bonds.
- C. Section 01 81 13 Sustainable Design Requirements
- D. Section 01 74 19 Construction Waste Management and Disposal
- E. Section 01 81 19 Indoor Air Quality Requirements
- F. Section 01 91 13 General Commissioning Requirements

#### 1.02 SECTION INCLUDES

- A. Work included in 23 00 00, HVAC Basic Requirements applies to Division 23, HVAC work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of heating, ventilating and air conditioning systems for proposed project.
- B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

#### C. Definitions:

- 1. Provide: To furnish and install, complete and ready for intended use.
- 2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
- 3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work provided.
- 4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
- 5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and othe rreviewing entity whose approval is required to obtain systems acceptance.

## 1.03 REFERENCE STANDARDS

A. State of Oregon:

- 1. OAR Oregon Administrative Rules
- 2. OESC Oregon Electrical Specialty Code
- 3. OFC Oregon Fire Code
- 4. OMSC Oregon Mechanical Specialty Code
- 5. OPSC Oregon Plumbing Specialty Code
- 6. OSSC Oregon Structural Specialty Code
- 7. OEESC Oregon Energy Efficiency Specialty Code
- Oregon Elevator Specialty Code
- B. Reference standards and guidelines include but are not limited to the latest adopted editions

#### from:

- 1. ABA Architectural Barriers Act
- 2. ABMA American Bearing Manufacturers Association
- 3. ADA Americans with Disabilities Act
- 4. AHRI Air-Conditioning Heating & Refrigeration Institute
- 5. AMCA Air Movement and Control Association
- 6. ANSI American National Standards Institute
- 7. ASCE American Society of Civil Engineers
- 8. ASHRAE American Society of Heating, Refrigeration and Air-Conditioning Engineers
- 9. ASHRAE Guideline 0, The Commissioning Process
- 10. ASME American Society of Mechanical Engineers
- 11. ASPE American Society of Plumbing Engineers
- 12. ASSE American Society of Sanitary Engineering
- 13. ASTM ASTM International
- 14. AWWA American Water Works Association
- CFR Code of Federal Regulations
- 16. CGA Compressed Gas Association
- 17. CHPS Collaborative for High Performance Schools
- 18. CISPI Cast Iron Soil Pipe Institute
- 19. CSA CSA International
- 20. EPA Environmental Protection Agency
- 21. ETL Electrical Testing Laboratories
- 22. FDA Food and Drug Administration
- 23. FM FM Global
- 24. GAMA Gas Appliance Manufacturers Association
- 25. HI Hydraulic Institute Standards
- 26. IAPMO International Association of Plumbing & Mechanical Officials
- 27. ICC International Code Council
- 28. IFGC International Fuel Gas Code
- 29. ISO International Organization for Standardization
- 30. LEED Leadership in Energy and Environmental Design

- 31. MSS Manufacturers Standardization Society
- 32. NEC National Electric Code
- 33. NEMA National Electrical Manufactures Association
- 34. NFPA National Fire Protection Association
- 35. NFGC National Fuel Gas Code
- 36. NRCA National Roofing Contractors Association
- 37. NSF National Sanitation Foundation
- 38. OSHA Occupational Safety and Health Administration
- 39. SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.
- 40. TEMA Tubular Exchanger Manufactures Association
- 41. TIMA Thermal Insulation Manufactures Association
- 42. UL Underwriters Laboratories, Inc.
- 43. USDA United States Department of Agriculture
- 44. USGBC United States Green Building Council
- C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
   2023b.
- D. FM (AG) FM Approval Guide Current Edition.
- E. NFPA 70 National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. SUSTAINABLE DESIGN SUBMITTALS
  - 1. General: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products in this section and provide documentation as follows:
    - a. LEED Material Information Form: Submit with each Product Data, a related and completed form with quantity (as applicable) and a summary of the applicable environmental attributes pertaining to LEED.
    - b. LEED Product Data: Submit product-specific support documentation with relevant LEED information highlighted, for the applicable environmental attributes identified in the LEED Material Information Form. Support documentation may include but is not limited to: product cut sheets, manufacturer literature, letter from manufacture, certification program documentation, Environmental Product Declaration (EPD), or Safety Data Sheets.
- C. Provide drawings in format and software release equal to the design documents. Drawings to
  - be the same sheet size and scale as the Contract Documents.
- D. In addition:
  - 1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction,

- coordination of the work with that of all other trades, and the satisfactory performance of the work.
- Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.
  - a. Label submittal to match numbering/references as shown in Contract Documents
     .Highlight and label applicable information to individual equipment or cross
     out/remove extraneous data not applicable to submitted model. Clearly note options
     and accessories to be provided, including field installed items. Highlight connections
     by/to other trades.
  - Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 23, HVAC Specification Sections for specific items required in product data submittal outside of these requirements.
  - For vibration isolation of equipment, list make and model selected with operating load and deflection.
  - d. See Division 23, HVAC individual Sections for additional submittal requirements.
- Maximum of two reviews of submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
- 4. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer's comments. Identify Engineer's comments and provide an individual response to each of the Engineer's comments. Cloud changes in the submittals and further identify changes which are in response to Engineer's comments.
- 5. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet Section 23 05 48, and provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Division 01 and in Structural documents.
- 6. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required by Division 23, HVAC Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
- 7. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
- 8. Substitutions and Variation from Basis of Design:
  - a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
  - o. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for

- approval prior to purchase, delivery or installation.
- 9. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, equipment, ductwork and piping layout plans, and control wiring diagrams. Reference individual Division 23, HVAC Specification Sections for additional requirements for shop drawings outside of these requirements.
  - a. Provide Shop Drawings indicating access panel locations for items that require Code or maintenance access, size and elevation for approval prior to installation.
- 10. Samples: Provide samples when requested by individual Sections.
- 11. Resubmission Requirements: Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
  - Resubmit for review until review indicates no exception taken or make "corrections as noted".
  - b. When submitting drawings for Engineers re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.
- 12. Operation and Maintenance Manuals:
  - a. Submit, at one time, electronic files (PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Include valve charts. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.
    - Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
    - 2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: belts, motors, lubricants, and filters.
    - 3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, and individual Sections.
    - 4) Include product certificates of warranties and guarantees.
    - Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub-assemblies.
    - Include copy of startup and test reports specific to each piece of equipment.
    - 7) Include copy of final air and water systems balancing log along with pump, fan and distribution system operating data.
    - 8) Include commissioning reports.
    - 9) Include copy of valve charts/schedules.
    - 10) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.
  - b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 23 00 00, HVAC Basic Requirements Article titled "Demonstration".
  - c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance, and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

E. Product Data & Shop Drawings: Provide product submittals and shop drawings in electronic format (pdf).

## F. Record Drawings:

- Maintain at site at least one set of drawings for recording "As-constructed" conditions.
   Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
- 2. Record Drawings are to include equipment and fixture/connection schedules, control dampers, fire smoke dampers, fire dampers, valves, bottom of pipe, duct and equipment elevations and dimensioned locations for all distribution systems (hydronic and air). Invert elevations and dimensioned locations for underground systems below grade to 5-feet outside building that accurately reflect "as constructed or installed" for project.
- 3. At completion of project, input changes to original project Revit Model and make one set of black-line drawings created from Revit Model in version/release equal to contract drawings. Submit drawings upon substantial completion.

#### 1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.
- B. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.
- C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space.
  Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.
- D. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with
   Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting

work.

- E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.
- F. Provide products that are UL and CSA listed.
- G. Piping and duct insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.
- H. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.
- Provide safety controls required by National Boiler Code (ASME CSD 1) for boilers and water heaters with an input of 400,000 BTUH and higher.
- J. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- K. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- L. Coordination Documents:
  - 1. Prior to construction, prepare and submit coordinated layout drawings (composite drawings), to coordinate installation and location of ductwork, grilles, diffusers, piping, fire sprinklers, plumbing, lights, and electrical services. Composite Drawings show services on single sheet. Key Drawings to structural column identification system. Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including plumbing, HVAC, fire protection, electrical, ceiling suspension, and ceiling tile systems, etc.), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence. Unless otherwise required by Division 00, Procurement and Contracting Requirements and/or Division 01, General Requirements, Division 23, HVAC to combine information furnished by other trades onto master coordination documents.
  - 2. Prepare Drawings as follows:
    - a. Coordination models/drawings may be created using Revit 3D modeled elements or a 3D CAD software. The modeled elements to be graphically represented within the model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the model elements. Model elements must have the ability to be spatially coordinated with other modeled elements using either Revit, Autodesk Navisworks or Autodesk A360.
    - b. Drawings in Revit Mode release equal to design documents. Drawings to be same sheet size and scale as Contract Drawings and indicate location, size and elevation above finished floor of equipment and distribution systems.

- Review and revise, as necessary, section cuts in Contract Drawings after verification of field conditions.
- d. Indicate hydronic and air distribution system piping including fittings, hangers, access panels, valves, and bottom of pipe and duct elevations above finished floor.
- e. Indicate inverts and provision for piping that must be graded to have right-of-way over more flexible items. Drawings also to indicate proposed ceiling grid and lighting layout as shown on electrical drawings and architectural reflected ceiling drawings and HVAC equipment, ductwork and piping.
- f. Incorporate Addenda items and change orders.
- g. Distribute drawings to trades and provide additional coordination as requested by other trades.
- Advise Architect in event conflict occurs in location or connection of equipment. Bear costs
  resulting from failure to properly coordinate installation or failure to advise Architect of
  conflict.
- 4. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.
- Submit final Coordination Drawings with changes as Record Drawings at completion of project.

#### 1.06 WARRANTY

- A. See Section 01 7800 Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

#### **PART 2 PRODUCTS**

### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.
  - 2. Paints and Coatings: For field applications that are inside the weatherproofing system, use paints and coatings that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.
  - 3. Plumbing Fixtures: Provide WaterSense (WS) certified fixtures for applicable products, including showerheads, tank-type toilets, flushometer-valve toilets, urinals, and private faucets. Cut sheets must include the flush (gallons per flush) and flow (gallons per minute) rates, and WaterSense certification.

### 2.02 ACCESS PANELS

A. See Division 01, General Requirements and Division 08, Openings for products and installation requirements. Confirm Access Panel requirements in Division 01, General Requirements,
 Division 08, Openings and individual Division 23, HVAC Sections. In absence of specific

requirements in Division 01, General Requirements, comply with the following:

- 1. Provide flush mounting access panels for service of systems and individual components requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly.
  - a. Ceiling access panels to be minimum 24-inch by 24-inch required and approved size.
  - b. Wall access panels to be minimum of 12-inch by 12-inch required and approved size.
  - c. Provide screwdriver operated catch; cylinder type locks. Provide two keys for each cylinder. Locks to be keyed for Master Keying; or cylinder type locks. Provide two keys for each cylinder. Locks to be keyed for or sequential keying system.
  - d. Manufacturers and Models:
    - 1) Drywall: Karp KDW.
    - 2) Plaster: Karp DSC-214PL.
    - Masonry: Karp DSC-214M.
    - 4) 2 hour rated: Karp KPF-350FR.
    - 5) Manufacturers: Milcor, Elmdor, Acudor or approved equivalent.

#### PART 3 EXECUTION

## 3.01 INSTALLATION AND ACCESSIBILITY

- A. Install in accordance with manufacturer's instructions.
- B. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, HVAC Basic
   Requirements and individual Division 23. HVAC Sections.
- C. Install equipment having components requiring access (i.e., drain pans, drains, control operators, valves, motors and vibration isolation devices) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.
- D. Install equipment and products complete as directed by manufacturer's installation instructions including all appurtenances recommended in manufacturer's installation instructions, at no additional charge to Owner. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.

## E. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following

- Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork Sections.
   Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.
- b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
- c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

## F. Firestopping:

- Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:
  - a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

# G. Pipe Installation:

- 1. Provide installation of piping systems coordinated to account for expansion and contraction of piping materials and building, as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, seismic flexible joints, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building with Project Structural Engineer. Verify construction phasing, type of building construction products and rating for coordinating installation of piping systems Include provisions for servicing and removal of equipment without dismantling piping.
- H. Plenums: Materials within plenums shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723. Immediately notify Architect / Engineer of any discrepancy.

## 3.02 COMMISSIONING

A. See Section 01 9113 - General Commissioning Requirements, for commissioning requirements.

### 3.03 SEISMIC CONTROL

- A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, Section 23 05 48, Vibration and Seismic Controls for HVAC Equipment, Division
  - 13, Special Construction, and individual Division 23 HVAC Sections.
  - 1. General: Earthquake resistant designs for HVAC (Division 23) equipment and distribution, i.e. motors, ductwork, piping, equipment, etc. to conform to regulations of jurisdiction having authority.
  - 2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting

base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping equipment and water heaters. Submit Shop Drawings along with equipment submittals.

- 3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.
- 4. Piping and Ductwork: Per "Seismic Restraints Manual Guidelines for Mechanical Systems" latest edition published by SMACNA or local requirements.
- 5. Provide means to prohibit excessive motion of mechanical equipment during earthquake.

#### 3.04 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing

Conditions. In absence of specific requirements, comply with individual Division 23, HVAC

Sections and the following:

- 1. Scope: It is the intent of these documents to provide necessary information and adjustments to the HVAC system required to meet code, and accommodate installation of new work. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
- Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.
- 3. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.
- 4. Unless specifically indicated on Drawings, remove exposed, unused ductwork and piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap and patch surfaces to match surrounding finish.
- 5. Unless specifically indicated on Drawings, remove unused equipment, fixtures, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).

## 3.05 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 00, Procurement and Contracting

Requirements and Division 01, General Requirements. In absence of specific requirements,

comply with individual Division 23, HVAC Sections and the following:

- 1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).
- Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftsmen of each respective trade in conformance with appropriate Division of Work.

- Additional openings required in building construction to be made by drilling or cutting. Use
  of jack hammer is specifically prohibited. Patch openings in and through concrete and
  masonry with grout.
- 4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
- Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

### 3.06 TEMPORARY HEATING, COOLING, AND HUMIDITY CONTROL

A. Provide temporary heating, cooling, controls, humidification and dehumidification as required to facilitate the construction of the project. Size and select temporary system based on the requirements of the various trades during construction. This includes, but is not limited to, drywall, case work, wood flooring and wood finishes that are subject to warping. Size and install system to prevent mold growth. Coordinate the location of the temporary system. The house system can be used. Develop a procedure for how the house system will be used including a sketch depicting the house system, how filtration will be used to prevent construction debris from entering the system and how often the filters will be changed, how the ductwork will be cleaned after use to ensure a clean system is turned over to the Owner and how the units are sized. Submit this procedure to the Mechanical Engineer for review. Follow National Air Duct Cleaners Association (NADCA) duct cleaning procedures and guidelines. Warranties for the house system, if new, to commence when the Owner moves in if house system is used as the means to maintain the climate within the building during construction. Include this warranty requirement in the original bid or proposal amount. Coordinate and provide any temporary power, controls, ductwork, piping, plumbing anchorage, miscellaneous steel and structural supports required to support the temporary system. Installation of the system to comply with all applicable codes and be acceptable to the Authority Having Jurisdiction (AHJ).

#### 3.07 EQUIPMENT SELECTION AND SERVICEABILITY

- A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.
- B. Maintain design intent where equipment other than as shown as Basis of Design in Contract Documents is provided. Where equipment requires ductwork or piping arrangement,

controls/control diagrams, or sequencing different from that indicated in Contract Documents, provide at no additional cost to Owner.

### 3.08 CLEANING AND PROTECTION OF PIPING & DUCTWORK

- A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.
- B. Cover and protect all piping and ductwork prior to installation to prevent any contamination and/or intrusion of moisture or debris. Cover and seal open ends of ductwork and fittings with plastic to protect them from dirt, dust, or debris prior to installation, and cover all mechanical system inlets, outlets, and grilles inside the building during construction to protect them from sheetrock dust, dirt, construction debris, etc.
- C. Replace any insulation, duct liner, products, or materials that become damaged due to water, dust, weather, or debirs as a result of improper storage prior to installation.

#### 3.09 INSTALLATION

- A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.
- B. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
- C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements.
  Replace damaged or malfunctioning controls and equipment. Do not place equipment in sustained operation prior to initial balancing of HVAC systems.
- Provide miscellaneous supports/metals required for installation of equipment, piping and ductwork.

E. Electrical interlocks: Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

### 3.10 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following: Coordinate locations/sizes of access panels with Architect prior to work.

### 3.11 REVIEW AND OBSERVATION

- A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.
- B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:
  - 1. Underground system installation prior to backfilling.
  - 2. Prior to covering walls.
  - 3. Prior to ceiling cover/installation.
  - 4. After major equipment is installed.
  - 5. When main systems, or portions of, are being tested and ready for inspection by AHJ.
  - Final Punch.
- C. Costs incurred by additional final punch list trips required due to incomplete systems will be the responsibility of the Contractor.

### 3.12 DEMONSTRATION, TRAINING, AND CLOSEOUT ACTIVITIES

- A. See Section 01 7800 Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
  - 1. Use operation and maintenance data as reference during demonstration.
  - 2. Conduct walking tour of project.
  - 3. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.
  - 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: Manufacturer's training personnel.
  - Location: At project site.

- 5. See other division 22 and 23 specification sections for additional training requirements. E. Acceptance:
  - Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:
    - a. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
      - 1) Testing and Balancing Reports
      - 2) Cleaning
      - 3) Operation and Maintenance Manuals
      - 4) Training of Operating Personnel
      - 5) Record Drawings
      - 6) Warranty and Guaranty Certificates
      - 7) Start-up/Test Document
      - 8) Commissioning Reports
- F. Letter of Conformance
  - Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that HVAC items were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

**END OF SECTION** 

#### **SECTION 23 0529**

### HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

#### **PART 1 GENERAL**

### 1.01 SECTION INCLUDES

A. Support and attachment components.

#### 1.02 RELATED REQUIREMENTS

- A. Section 03 3000 Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 01 81 13 Sustainable Design Requirements
- C. Section 01 74 19 Construction Waste Management and Disposal
- D. Section 01 81 19 Indoor Air Quality Requirements
- E. Section 01 91 13 General Commissioning Requirements
- F. Section 23 0548 Vibration and Seismic Controls for HVAC.

# 1.03 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 2023.
- C. ASTM A181/A181M Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2023.
- D. ASTM A36/A36M Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- G. ASTM A395/A395M Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).
- H. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel2023.
- I. FM (AG) FM Approval Guide Current Edition.

- J. MFMA-4 Metal Framing Standards Publication 2004.
- K. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection,
   Application, and Installation 2018, with Amendment (2019).
- L. UL (DIR) Online Certifications Directory Current Edition.

### 1.04 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 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 3000.

### 1.05 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
  - Fiberglass Channel (Strut) Framing Systems: Include requirements for strength derating according to ambient temperature.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
  - Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

# 1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

## 2.01 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. Prefabricated Trapeze-Framed Metal Strut Systems:
  - 1. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    - b. Gripple, Inc: www.gripple.com/#sle.
    - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
  - 2. Strut Channel or Bracket Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
  - 3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

## C. Hanger Rods:

- Threaded zinc-plated steel unless otherwise indicated.
- D. Beam Clamps:
  - 1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
  - Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
  - 3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
  - 4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
  - 5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
  - 6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,
  - 7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
  - 8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- E. Anchors and Fasteners:
  - 1. Manufacturers Mechanical Anchors:
    - a. Hilti, Inc: www.us.hilti.com/#sle.
    - b. Powers Fasteners, Inc: www.powers.com/#sle.
    - c. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
  - 2. Manufacturers Powder-Actuated Fastening Systems:
    - a. Hilti, Inc: www.us.hilti.com/#sle.
    - b. Powers Fasteners, Inc: www.powers.com/#sle.
    - c. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
  - 3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
  - 4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  - 5. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
  - Wood: Use wood screws.
  - 7. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    - Comply with MFMA-4.
    - b. Channel Material: Use galvanized steel.
    - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

### **PART 3 EXECUTION**

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- 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.

#### 3.02 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. 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. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.
- J. Channel Support System Installation:
  - 1. Arrange for grouping of parallel runs of piping and support together on field-assembledchannel systems.
  - Field assemble and install according to manufacturer's written instructions.N. Install
    hangers and supports complete with necessary inserts, bolts, rods, nuts, washers,
    andother accessories.
- K. Install hangers and supports to allow controlled thermal and seismic movement of pipingsystems, to permit freedom of movement between pipe anchors, and to facilitate action ofexpansion joints, expansion loops, expansion bends, and similar units.
- L. Load Distribution: Install hangers and supports so that piping live and dead loads and stressesfrom movement will not be transmitted to connected equipment.

- 1. Arrange for grouping of parallel runs of piping and support together on field-assembledchannel systems.
- 2. Field assemble and install according to manufacturer's written instructions.
- M. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, andother accessories.
- N. Install hangers and supports to allow controlled thermal and seismic movement of pipingsystems, to permit freedom of movement between pipe anchors, and to facilitate action ofexpansion joints, expansion loops, expansion bends, and similar units.
- O. Load Distribution: Install hangers and supports so that piping live and dead loads and stressesfrom movement will not be transmitted to connected equipment.
- P. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping, ductwork and equipment to proper level and elevations.
- Q. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which arenot factory painted.
- R. Horizontal Piping Hangers and Supports; Horizontal and Vertical Piping, and Hanger Rod Attachments:
  - 1. Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems and in accordance with manufacturer's published product information.
  - 2. Use only one type by one manufacturer for each piping service.
  - 3. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping.
  - 4. Pipe support spacing (pipe supported in ceiling or floor-supported) to meet latest applicable Code and manufacturer's requirements.
  - 5. Provide copper-plated hangers and supports for uninsulated copper piping systems.
- S. Plumber's Tape not permitted as pipe hangers or pipe straps.
- T. Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. For horizontally hung grooved-end piping, provide a minimum of 2 hangers per pipe section.
- U. Pipe Ring Diameters:
  - 1. Uninsulated and Insulated Pipe, Except Where Oversized Pipe Rings are Specified: Ring inner diameter to suit pipe outer diameter.
  - 2. Insulated Piping Where Oversized Pipe Rings are Specified and Vibration Isolating Sleeves: Ring inner diameter to suit outer diameter of insulation or sleeve.
- V. Oversize Pipe Rings: Provide oversize pipe rings of 2-inch and larger size.

- W. Pipe Support Brackets: Support pipe with pipe slides.
- X. Steel Backing in Walls: Provide steel backing in walls to support fixtures and piping hung fromsteel stud walls.
- Y. Pipe Guides:
  - 1. Install on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides to pipe structure. Contact with chilled water pipe does not permit heat to betransferred in sufficient quantity to cause condensation on any surface.
  - 2. Install approximately four pipe diameters (first guide) and 14 diameters (second guide) away from each end of expansion joints. Do not use as supports. Provide in addition toother required pipe hangers and supports.
- Z. Heavy-Duty Steel Trapeze Installation:
  - 1. Arrange for grouping of parallel runs of horizontal piping and support together on fieldfabricated, heavy-duty trapezes.
  - 2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size orinstall intermediate supports for smaller diameter pipes as specified above for individualpipe hangers.
  - Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- AA. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers.
  - Maximum spacings: MSS SP-58.AD.
- BB. Where piping of various sizes is to be supported together by trapeze hangers, space hangersfor smallest pipe size or install intermediate supports for smaller diameter pipe.
- CC. Do not support piping from other piping.
- DD. Fire protection piping will be supported independently of other piping.
- EE. Prevent electrolysis in support of copper tubing by use of hangers and supports which arecopper plated.
- FF. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximumpipe deflections allowed by ASME B31.9, "Building Services Piping" is not exceeded.
- GG. Insulated Piping:
  - Attach clamps and spacers to piping.
    - a. Piping Operating Above Ambient Air Temperature: Clamp may project throughinsulation.
    - b. Piping Operating Below Ambient Air Temperature: Use thermal-hanger shield insertwith clamp sized to match OD of insert.
  - 2. Do not exceed pipe stress limits according to ASME B31.9.

- 3. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier isindicated. Fill interior voids with insulation that matches adjoining insulation.
- 4. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields tospan arc of 180 degrees.
- 5. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution platefor pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
- Shield Dimensions for Pipe, not less than the following:a. NPS 1/4 to NPS 3-1/2 (DN8 to DN 90): 12-inches long and 0.048-inch thick.b. NPS 4 (DN100): 12-inches long and 0.06-inch thick.c. NPS 5 and NPS 6 (DN125 and DN150): 18-inches long and 0.06-inch thick.d. NPS 8 to NPS 14 (DN200 to DN350): 24-inches long and 0.075-inch thick.e. NPS 16 to NPS 24 (DN400 to DN600): 24-inches long and 0.105-inch thick.
- 7. Pipes NPS 8 (DN200) and Larger: Include wood inserts.a. Insert Material: Length at least as long as protective shield.
- 8. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- HH. Pipe Anchors: Provide anchors to fasten piping which is subject to expansion and

contraction, and adjacent to equipment to prevent loading high forces onto the equipment.

# II. Pipe Curb Assemblies:

- 1. Provide prefabricated units for roof membrane and insulation penetrations related toequipment. Coordinate with roofing system. Set supports on the structural deck. Do notset supports on insulation or roofing. Provide level supports by prefabricated pitch builtinto the curb.
- Provide for piping and electrical conduit which penetrates the structural roof deck toservice equipment above the roof level (i.e., piping, electrical power and control wiring). Meet requirements of roof warranty.
- JJ. Escutcheon Plates: Install around horizontal and vertical piping at visible penetrations throughwalls, partitions, floors, or ceilings, including penetrations through closets, through

below ceilingcorridor walls, and through equipment room walls and floors.

#### KK. Vertical Piping:

otherwise.

- 1. Support with U-clamps fastened to wall to hold piping away from wall unless otherwiseapproved.
- 2. Riser clamps to be directly under fitting or welded to pipe.a. Riser to be supported at each floor of penetration.b. Provide structural steel supports at the base of pipe risers. Size supports to carryforces exerted by piping system when in operation.
- LL. Piping above roof to be supported with freestanding roof pipe supports unless detailed
  - 1. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier isindicated. Fill interior voids with insulation that matches adjoining insulation.
  - 2. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields tospan arc of 180 degrees.
  - 3. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution platefor pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
  - 4. Shield Dimensions for Pipe, not less than the following:

- a. NPS 1/4 to NPS 3-1/2 (DN8 to DN 90): 12-inches long and 0.048-inch thick.
- b. NPS 4 (DN100): 12-inches long and 0.06-inch thick.
- c. NPS 5 and NPS 6 (DN125 and DN150): 18-inches long and 0.06-inch thick.
- d. NPS 8 to NPS 14 (DN200 to DN350): 24-inches long and 0.075-inch thick.
- e. NPS 16 to NPS 24 (DN400 to DN600): 24-inches long and 0.105-inch thick.
- 5. Pipes NPS 8 (DN200) and Larger:
  - a. Include wood inserts.
  - b. Insert Material: Length at least as long as protective shield.
- 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- MM. Pipe Anchors: Provide anchors to fasten piping which is subject to expansion and
  - contraction, and adjacent to equipment to prevent loading high forces onto the equipment.
- NN. Piping above roof to be supported with freestanding roof pipe supports unless detailed otherwise.

#### 3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 Quality Requirements for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

## **END OF SECTION**

### **SECTION 23 0548**

## **VIBRATION AND SEISMIC CONTROLS FOR HVAC**

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Seismic control requirements.
  - Includes requirements for seismic qualification of equipment not specified in this section.
- C. Vibration-isolated equipment support bases.
- D. Vibration isolators.
- E. Seismic restraint systems.

## 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements
- E. Section 03 3000 Cast-in-Place Concrete.
- F. Section 23 0529 Hangers and Supports for HVAC Piping and Equipment.

#### 1.03 DEFINITIONS

- A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

### 1.04 REFERENCE STANDARDS

- A. ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures

  Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASCE 19 Structural Applications of Steel Cables for Buildings 2016.
- C. ASHRAE (HVACA) ASHRAE Handbook HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.

- D. FEMA 412 Installing Seismic Restraints for Mechanical Equipment 2014.
- E. FEMA 413 Installing Seismic Restraints for Electrical Equipment 2004.
- F. FEMA 414 Installing Seismic Restraints for Duct and Pipe 2004.
- G. FEMA E-74 Reducing the Risks of Nonstructural Earthquake Damage 2012.
- H. ICC-ES AC156 Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components 2010, with Editorial Revision (2020).
- I. MFMA-4 Metal Framing Standards Publication 2004.
- J. SMACNA (SRM) Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

### 1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment 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. Seismic Controls:
    - Coordinate the arrangement of seismic restraints with piping, conduit, equipment, and other potential conflicts installed under other sections or by others.
    - b. Coordinate the work with other trades to accommodate relative positioning of essential and nonessential components in consideration of seismic interaction.
  - 5. Notify Architect of any conflicts with or deviations from 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 3000.

## 1.06 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
  - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
  - 2. Seismic Controls: Include seismic load capacities.

- D. Shop Drawings Vibration Isolation Systems:
  - 1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
- E. Shop Drawings Seismic Controls:
  - 1. Include dimensioned plan views and sections indicating proposed HVAC component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
  - 2. Identify mounting conditions required for equipment seismic qualification.
  - 3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
  - 4. Indicate proposed arrangement of distributed system trapeze support groupings.
  - 5. Indicate proposed locations for distributed system flexible fittings and/or connections.
  - 6. Indicate locations of seismic separations where applicable.
- F. Seismic Design Data:
  - Compile information on project-specific characteristics of actual installed HVAC components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
    - a. Component operating weight and center of gravity.
    - b. Component elevation in the building in relation to the roof elevation (z/h).
    - c. Component importance factor (lp).
    - d. For distributed systems, component materials and connection methods.
    - e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.
    - f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).
  - Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.
- G. Certification for seismically qualified equipment; identify basis for certification.
- H. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.
- Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- J. Evidence of qualifications for seismic controls designer.

### 1.07 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located and with minimum five years experience designing seismic restraints for nonstructural components.

## 1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### 2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
  - 1. Select vibration isolators to provide required static deflection.
  - Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
  - 3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
  - 4. Select vibration isolators for outdoor equipment to comply with wind design requirements.

## 2.02 SEISMIC CONTROL REQUIREMENTS

- A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.
- B. Seismic Design Criteria: Obtain from project Structural Engineer of Record.
- C. Component Importance Factor (Ip): HVAC components essential to life safety to be assigned a component importance factor (Ip) of 1.5 as indicated or as required. This includes but is not limited to:
  - 1. HVAC components required to function for life safety purposes after an earthquake.
  - 2. HVAC components that support or otherwise contain hazardous substances.
- D. Seismic Qualification of Equipment:
  - 1. Provide special certification for HVAC equipment furnished under other sections and assigned a component importance factor (Ip) of 1.5, certifying that equipment will remain operable following a design level earthquake.

- 2. Seismic qualification to be by shake table testing in accordance with recognized testing standard procedure, such as ICC-ES AC156, acceptable to authorities having jurisdiction.
- 3. Notify Architect and obtain direction where mounting restrictions required by conditions of seismic certification conflict with specified requirements.
- 4. Seismically qualified equipment to be furnished with factory-installed labels referencing certificate of compliance and associated mounting restrictions.

## E. Seismic Restraints:

- Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
- 2. Seismic Restraint Exemptions:
  - a. Exemptions for Seismic Design Category C:
    - 1) HVAC components where either of the following apply:
      - (a) The component importance factor (lp) is 1.0 and the component is positively attached to the structure.
      - (b) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.
    - 2) HVAC piping with component importance factor (Ip) of 1.5 and nominal pipe size of 2 inch or less, where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, and where piping is positively attached to the structure; exemption does not apply to piping constructed of low-deformability materials (e.g., cast iron, glass, nonductile plastics).
  - b. Exemptions for Seismic Design Category D, E, and F:
    - 1) Discrete HVAC components that are positively attached to the structure where either of the following apply:
      - (a) The component weighs 400 pounds or less, has a center of mass located 4 feet or less above the adjacent floor level, flexible connections are provided between the component and associated ductwork, piping, and conduit, and the component importance factor (Ip) is 1.0.
      - (b) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.
    - 2) HVAC piping with component importance factor (Ip) of 1.0 and nominal pipe size of 3 inch or less, or with component importance factor (Ip) of 1.5 and nominal pipe size of 1 inch or less, where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, and where piping is positively attached to the structure; exemption does not apply to piping constructed of low-deformability materials (e.g., cast iron, glass, nonductile plastics).
  - c. Duct System Exemptions, All Seismic Design Categories:
    - 1) Duct systems not designed to carry toxic, highly toxic, or flammable gases and not used for smoke control with component importance factor (Ip) of 1.0, where flexible connections or other assemblies are provided between duct system and associated components, where duct system is positively attached to the structure, and where one of the following apply:
      - (a) Trapeze supported duct with trapeze assemblies using 3/8 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 100 pounds or less.
      - (b) Trapeze supported duct with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 200 pounds or less.

- (c) Trapeze supported duct with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 24 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 100 pounds or less.
- (d) Hanger supported duct with individual rod hangers 3/8 inch or 1/2 inch in diameter not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single rod is 50 pounds or less.
- 2) Duct systems not designed to carry toxic, highly toxic, or flammable gases and not used for smoke control, where there are provisions to avoid impact with other ducts or mechanical components or to protect ducts in the event of such impact, and where duct system is positively attached to the structure and has a cross sectional area of less than 6 square feet and weighs 20 pounds per foot or less.
- d. HVAC Piping Exemptions, All Seismic Design Categories:
  - 1) HVAC piping where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, where piping is positively attached to the structure, and where one of the following apply:
    - (a) Trapeze supported piping weighing less than 10 pounds per foot, where all pipes supported meet size requirements for exemption as single pipes described under specific seismic design category exemptions above.
    - (b) Trapeze supported piping with trapeze assemblies using 3/8 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds or less.
    - (c) Trapeze supported piping with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 200 pounds or less.
    - (d) Trapeze supported piping with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 24 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds or less.
    - (e) Hanger supported piping with individual rod hangers 3/8 inch or 1/2 inch in diameter not exceeding 12 inches in length from support point connection to the supporting structure, where pipe has a component importance factor (Ip) of 1.0 and meets size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single rod is 50 pounds or less.
- 3. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
  - a. ASHRAE (HVACA).
  - b. FEMA 412.
  - c. FEMA 413.
  - d. FEMA 414.
  - e. FEMA E-74.
  - f. SMACNA (SRM).

- 4. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
- Seismic Type Vibration Isolators:
  - a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
- 6. Seismic Restraint Systems:
  - a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
  - b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
  - c. Use only one restraint system type for a given HVAC component or distributed system (e.g., ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.
  - d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
  - e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported HVAC component weight.
  - f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported HVAC component weight.
  - g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
  - h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
  - Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.
- 7. Ductwork Applications:
  - a. Provide independent support and seismic restraint for in-line components (e.g., fans, heat exchangers, humidifiers) having an operating weight greater than 75 pounds.
  - Positively attach appurtenances (e.g., dampers, louvers, diffusers) with mechanical fasteners.

### F. Seismic Attachments:

- 1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
- Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC
  Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities
  having jurisdiction for compliance with applicable building code, and qualified for seismic
  applications; concrete anchors to be qualified for installation in both cracked and
  uncracked concrete.
- 3. Do not use power-actuated fasteners.
- Do not use friction clips (devices that rely on mechanically applied friction to resist loads).
   Beam clamps may be used for supporting sustained loads where provided with restraining straps.
- 5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
- 6. Concrete Housekeeping Pads:
  - a. Increase size of pad as required to comply with anchor requirements.

- b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.
- G. Seismic Interactions:
  - Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.
  - 2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.
  - 3. Comply with minimum clearance requirements between HVAC equipment, distribution systems, and associated supports and fire protection sprinkler system drops and sprigs.
- H. Seismic Relative Displacement Provisions:
  - 1. Use suitable fittings or flexible connections to accommodate:
    - a. Relative displacements at connections between components, including distributed systems (e.g., ductwork, piping); do not exceed load limits for equipment utility connections.
    - b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
    - c. Design displacements at seismic separations.
    - d. Anticipated drifts between floors.

## 2.03 VIBRATION ISOLATORS

- A. Manufacturers:
  - 1. Vibration Isolators:
    - a. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
    - b. Mason Industries: www.mason-ind.com/#sle.
- B. General Requirements:
  - 1. Resilient Materials for Vibration Isolators: Oil. ozone, and oxidant resistant.
  - 2. Spring Elements for Spring Isolators:
    - a. Color code or otherwise identify springs to indicate load capacity.
    - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
    - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
    - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
    - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
    - f. Selected to function without undue stress or overloading.
  - 3. Seismic Snubbing Elements for Seismic Isolators:
    - a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
    - b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.
- C. Vibration Isolators for Nonseismic Applications:
  - 1. Resilient Material Isolator Pads:
    - a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
    - b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
    - c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.

- 2. Open (Unhoused) Spring Isolators:
  - Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
  - b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
  - Furnished with integral leveling device for positioning and securing supported equipment.
- 3. Housed Spring Isolators:
  - Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
  - b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
  - c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
  - d. Furnished with integral leveling device for positioning and securing supported equipment.
- 4. Spring Isolator Hangers, Nonseismic:
  - a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
  - b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
- D. Vibration Isolators for Seismic Applications:
  - 1. Resilient Material Isolator Mounts, Seismic:
    - a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) isolator material; specifically designed and rated for seismic applications with integral snubbing in all directions.
  - 2. Spring Isolator Hangers, Seismic:
    - a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
    - b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

#### 2.04 ACOUSTICAL AND VIBRATION ISOLATORS

- A. General Requirements:
  - Acoustical Isolation System: Through-stud isolators, pipe clamps, riser clamp pads, neoprene and felt lining material and associated support brackets.

### 2.05 SEISMIC RESTRAINT SYSTEMS

- A. Manufacturers:
  - 1. Seismic Restraint Systems:
    - a. Kinetics Noise Control. Inc: www.kineticsnoise.com/#sle.
    - b. Mason Industries: www.mason-ind.com/#sle.
- B. Description: System components and accessories specifically designed for field assembly and

attachment of seismic restraints.

## C. Cable Restraints:

- 1. Comply with ASCE 19.
- 2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
- 3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
- 4. Use protective thimbles for cable loops where potential for cable damage exists.
- D. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

### **PART 3 EXECUTION**

### 3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

## 3.02 CODE-REQUIRED SPECIAL INSPECTIONS

- A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 01 4533 and statement of special inspections as required by applicable building code.
- B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
  - 1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
  - Periodic Special Inspections: Special Inspection Agency to be present in the area where
    work is being performed and observe the work part-time or intermittently and at the
    completion of the work.
- C. Seismic special inspections include, but are not limited to:
  - 1. Seismically Qualified Equipment: Verification that label, anchorage, and mounting comply with the certificate of compliance.
  - 2. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units for Seismic Design Categories C, D, E, and F; periodic inspection.
  - 3. Installation and anchorage of ductwork designed to carry hazardous materials for Seismic Design Categories C, D, E and F; periodic inspection.
  - 4. Installation and anchorage of vibration isolation systems for Seismic Design Categories C, D, E, and F where the approved Contract Documents require a nominal clearance of 1/4 inch or less between equipment support frame and seismic restraint; periodic inspection.
  - 5. Verification of required clearances between HVAC equipment, distribution systems, and associated supports and fire protection sprinkler system drops and sprigs for Seismic

Design Categories C, D, E, and F; periodic inspection.

- D. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.
- E. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

### 3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
  - Spring Isolators:
    - a. Position equipment at operating height; provide temporary blocking as required.
    - Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
    - c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
  - 2. Isolator Hangers:
    - a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
    - Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
  - Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
  - 4. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
  - 5. Adjust isolators to be free of isolation short circuits during normal operation.
  - 6. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.
- F. Seismic Controls:
  - 1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
  - 2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
  - 3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
  - 4. Equipment with Sheet Metal Housings:

- a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
- b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
- c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
- 5. Concrete Housekeeping Pads:
  - a. Size in accordance with seismic design to meet anchor requirements.
  - b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
- 6. Seismic Restraint Systems:
  - a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
  - b. Install restraints within permissible angles in accordance with seismic design.
  - c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
  - d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
  - e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

### 3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Vibration Isolation Systems:
  - 1. Verify isolator static deflections.
  - 2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- D. Seismic Controls:
  - 1. Verify snubbing element air gaps.
- E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

### **END OF SECTION**

### **SECTION 23 0553**

## **IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

### 1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Pipe markers.
- E. Ceiling tacks.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements

### 1.03 REFERENCE STANDARDS

- A. ASME A13.1 Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 Standard Specification for Laminated Thermosetting Materials 2017.

# 1.04 SUBMITTALS

- A. See Section 01 3000 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.

## **PART 2 PRODUCTS**

## 2.01 IDENTIFICATION APPLICATIONS

- A. Automatic Controls: Tags. Key to control schematic.
- B. Control Panels: Nameplates.
- C. Dampers: Ceiling tacks, where located above lay-in ceiling.
- D. Ductwork: Adhesive backed duct markers.
- E. Instrumentation: Tags.
- F. Major Control Components: Nameplates.

- G. Small-sized Equipment: Tags.
- H. Thermostats: Nameplates.

#### 2.02 NAMEPLATES

- A. Manufacturers:
  - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
  - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
  - 3. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.
- B. Letter Color: White.
- C. Letter Height: 1/4 inch.
- D. Background Color: Black.
- E. Plastic: Comply with ASTM D709.

#### 2.03 TAGS

- A. Manufacturers:
  - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
  - 2. Seton Identification Products, a Tricor Company: www.seton.com/#sle.
  - Hanply.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

# 2.04 ADHESIVE-BACKED DUCT MARKERS

- A. Manufacturers:
  - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
  - Craftmark Pipe Markers: www.craftmarkid.com/#sle.
- B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.
- C. Style: Individual Label.
- D. Color: Yellow/Black.

# 2.05 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

#### **PART 3 EXECUTION**

# 3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

#### 3.02 INSTALLATION

A. Valve Identification

- 1. Identify valves with metal tags, legends to be stamped or embossed.
- 2. Indicate the function of the valve and its normal operating position.
- Contact Facilities for coordination with existing building tagging system and supplementary information required for any specific system before valve tagging begins.
- 4. Label and label ceilings or ceiling grid at location of main system isolation and equipment control valves.

#### B. Labeling

- 1. Label all piping with system description and directional flow arrows.
- Label all piping every 25 feet and within 5 feet of tees, elbows, and wall or floor penetrations.

# C. Equipment Identification

- 1. Tag pumps, air handling supply units, fans, terminal units, converters, and miscellaneous equipment items with engraved nameplates.
- 2. Identify unit with equipment tag as shown on Construction Documents, and area served.
- 3. Permanently identify access points to fire dampers, smoke dampers, and fire/smoke dampers on the exterior of the duct.
- 4. Label shall be constructed from same material as equipment nameplates.
- 5. Provide Equipment Nameplate Directory:
  - a. HRVs
  - b. Air Handlers
  - c. Fan Coil Units
  - d. VRF Outdoor Units
  - e. Other Equipment Nameplates
- 6. List the following on the Nameplate Directory for each piece of equipment:
  - a. Designation
  - b. Model Number
  - c. Location of Equipment
  - d. Area Served or Function
  - e. Disconnect Location
  - f. Normal Position of HOA Switch
- 7. Where equipment is located above ceilings or behind walls, provide ½ inch adhesive tape indicating the equipment tag at the access location (T-bar ceiling grid, access door, etc.)
- D. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with

sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

- E. Install tags with corrosion resistant chain.
- F. Install plastic pipe markers in accordance with manufacturer's instructions.
- G. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- H. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- 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.
- J. Install ductwork with labels. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

#### **SECTION 23 0593**

#### TESTING, ADJUSTING, AND BALANCING FOR HVAC

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.
- C. Commissioning activities.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality RequirementsSection 01 91 13 General Commissioning Requirements
- D. Section 01 9113 General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- E. Section 23 0800 Commissioning of HVAC.
- F. Follow all Testing, Adjusting, & Balancing requirements of the Multnomah County Facilities Specification Standards.

#### 1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) AABC National Standards for Total System Balance, 7th Edition 2016.
- B. ASHRAE Std 111 Measurement, Testing, Adjusting, and Balancing of Building HVAC
   Systems 2008, with Errata (2019).
- NEBB (TAB) Procedural Standard for Testing Adjusting and Balancing of Environmental Systems 2019.
- D. SMACNA (TAB) HVAC Systems Testing, Adjusting and Balancing 2002.

# 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.

- 1. Submit to Architect.
- Submit to the Commissioning Authority.
- 3. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
- 4. Include at least the following in the plan:
  - List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
  - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
  - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
  - d. Final test report forms to be used.
  - e. Detailed step-by-step procedures for TAB work for each system and issue, including:
    - Terminal flow calibration (for each terminal type).
    - 2) Diffuser proportioning.
    - 3) Branch/submain proportioning.
    - 4) Total flow calculations.
    - 5) Rechecking.
    - 6) Diversity issues.
  - . Expected problems and solutions, etc.
  - g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
  - h. Details of how TOTAL flow will be determined; for example:
    - Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
    - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
  - i. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
  - Confirmation of understanding of the outside air ventilation criteria under all conditions.
  - k. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
  - I. Method of checking building static and exhaust fan and/or relief damper capacity.
  - m. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
  - Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
  - o. Procedures for formal progress reports, including scope and frequency.
  - p. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Logs: Submit at least twice a week to the Commissioning Authority.
- E. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- F. Progress Reports.

- G. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - Submit to the the Commissioning Authority 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.
  - Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
  - 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.
- H. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

# PART 2 PRODUCTS - NOT USED PART 3 EXECUTION

#### 3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC (NSTSB), 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 SMACNA (TAB)
- 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. Assume responsibility for recording calibration factors of all airflow monitors including showing the corresponding traverse measurements captured while balancing.
- E. TAB Agency Qualifications:
  - 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.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.

- c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- F. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

#### 3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work (provided in writing by the installing contractor). 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.
  - 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.
  - 13. Pumps are rotating correctly.
  - 14. Proper strainer baskets are clean and in place.
  - 15. Service and balance valves are open.
- 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.

# 3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

#### 3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 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.

#### 3.05 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.
- Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

#### 3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- 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 extend 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.
- 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. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- 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.
- M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
- N. On fan powered VAV boxes, adjust air flow switches for proper operation.

#### 3.07 COMMISSIONING

- A. See Sections 01 9113 General Commissioning Requirements and 23 0800 for additional requirements.
- B. Perform prerequisites prior to starting commissioning activities.
- C. Fill out Prefunctional Checklists for:
  - 1. Air side systems.
  - Water side systems.
- D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.
- E. Re-check a random sample equivalent to 25 percent of the final TAB report data as directed by Commissioning Authority.

- 1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
- 2. Use the same test instruments as used in the original TAB work.
- 3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
- 4. For purposes of re-check, failure is defined as follows:
  - a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
  - b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
  - c. Temperatures: Deviation of more than one degree F.
  - d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
  - e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
- 5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.
- F. In the presence of the Commissioning Authority, verify that:
  - 1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
  - 2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
  - 3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

# **3.08 SCOPE**

- A. Test, adjust, and balance the following items including but not limited to:
  - 1. Plumbing Pumps & Domestic HW System.
  - 2. Packaged Roof Top Heating/Cooling Units & Heat Recovery Ventilators.
  - Air Inlets and Outlets.

#### 3.09 MINIMUM DATA TO BE REPORTED

- A. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- B. 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.
- Sheave Make/Size/Bore.

# C. Air Moving Equipment:

- 1. Location.
- 2. Manufacturer.
- 3. Model number.
- 4. Serial number.
- 5. Arrangement/Class/Discharge.
- 6. Air flow, specified and actual.
- 7. Return air flow, specified and actual.
- 8. Outside air flow, specified and actual.
- 9. Total static pressure (total external), specified and actual.
- 10. Inlet pressure.
- 11. Discharge pressure.
- 12. Sheave Make/Size/Bore.
- 13. Number of Belts/Make/Size.
- 14. Fan RPM.

#### D. Return Air/Outside Air:

- 1. Identification/location.
- 2. Design air flow.
- 3. Actual air flow.
- 4. Design return air flow.
- 5. Actual return air flow.
- 6. Design outside air flow.
- 7. Actual outside air flow.
- 8. Return air temperature.
- 9. Outside air temperature.
- 10. Required mixed air temperature.
- 11. Actual mixed air temperature.
- 12. Design outside/return air ratio.
- 13. Actual outside/return air ratio.

# E. Duct Traverses:

- 1. System zone/branch.
- 2. Duct size.
- 3. Area.

- 4. Design velocity.
- 5. Design air flow.
- 6. Test velocity.
- 7. Test air flow.
- 8. Duct static pressure.
- 9. Air temperature.
- 10. Air correction factor.
- F. Air Distribution Tests:
  - 1. Air terminal number.
  - 2. Room number/location.
  - 3. Terminal type.
  - 4. Terminal size.
  - 5. Area factor.
  - 6. Design velocity.
  - 7. Design air flow.
  - 8. Test (final) velocity.
  - 9. Test (final) air flow.
  - 10. Percent of design air flow.

#### **SECTION 23 0713**

#### **DUCT INSULATION**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Jacketing and accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 Construction Waste Management and Disposal
- B. Section 01 81 19 Indoor Air Quality Requirements
- C. Section 01 91 13 General Commissioning Requirements
- D. Section 23 0553 Identification for HVAC Piping and Equipment.
- E. Section 23 3100 HVAC Ducts and Casings: Glass fiber ducts.

#### 1.03 REFERENCE STANDARDS

- A. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- B. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- C. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- D. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
   2014 (Reapproved 2019).
- E. ASTM C916 Standard Specification for Adhesives for Duct Thermal Insulation 2020.
- F. ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- G. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.
- H. ASTM E96/E96M Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

- ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- J. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible 2020.
- K. UL 181A Closure Systems for Use with Rigid Air Ducts Current Edition, Including All Revisions.
- UL 723 Standard for Test for Surface Burning Characteristics of Building Materials Current
   Edition, Including All Revisions.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. SUSTAINABLE DESIGN SUBMITTALS
  - General: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products in this section and provide documentation as follows:.
    - LEED Material Information Form: Submit with each Product Data, a related and completed form with quantity (as applicable) and a summary of the applicable environmental attributes pertaining to LEED.
    - b. LEED Product Data: Submit product-specific support documentation with relevant LEED information highlighted, for the applicable environmental attributes identified in the LEED Material Information Form. Support documentation may include but is not limited to: product cut sheets, manufacturer literature, letter from manufacture, certification program documentation, Environmental Product Declaration (EPD), or Safety Data Sheets.

# 1.05 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.

#### 1.06 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**

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.

#### 2.02 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.

#### 2.03 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
  - 1. Johns Manville: www.jm.com/#sle.
  - 2. Knauf Insulation; Atmosphere Duct Wrap: www.knaufinsulation.com/#sle.
  - 3. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
  - Maximum Service Temperature: 1,200 degrees F.
  - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  - 3. Secure with pressure-sensitive tape.

### 2.04 GLASS FIBER, RIGID

- A. Manufacturer:
  - 1. Johns Manville: www.jm.com/#sle.
  - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
  - 3. Owens Corning Corporation; 700 Series FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
  - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Maximum Service Temperature: 450 degrees F.
  - 3. Maximum Water Vapor Absorption: 5.0 percent.
  - Maximum Density: 8.0 pcf.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.

- Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
- 3. Secure with pressure-sensitive tape.

#### 2.05 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
  - Armacell LLC: www.armacell.us/#sle.
  - 2. K-Flex USA LLC: Insul-Sheet: www.kflexusa.com/#sle.
- B. 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. Connection: Waterproof vapor barrier adhesive.

#### 2.06 JACKETING AND ACCESSORIES

A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.

- B. Aluminum Jacket:
  - 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.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

#### 2.07 DUCT LINER

- A. Manufacturers:
  - 1. Armacell LLC; ArmaFlex Ultra with FlameDefense: www.armacell.us/#sle.
  - 2. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
  - 3. Johns Manville: www.jm.com/#sle.
  - 4. Knauf Insulation: www.knaufinsulation.com/#sle.
  - 5. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071;

flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.

- 1. Fungal Resistance: No growth when tested according to ASTM G21.
- 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
- 3. Service Temperature: Up to 250 degrees F.
- 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

#### 3.02 INSTALLATION

- A. Insulate all ductwork per Oregon Energy Efficiency Specialty Code requirements.
- B. Install in accordance with manufacturer's instructions.
- C. Install in accordance with NAIMA National Insulation Standards.
- D. Insulated Ducts Conveying Air Below Ambient Temperature:
  - 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.
- E. Insulated Ducts Conveying Air Above Ambient Temperature:
  - 1. Provide with or without standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- F. 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.
- G. Duct and Plenum Liner Application:
  - 1. Adhere insulation with adhesive for 90 percent coverage.
  - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
  - 3. Seal and smooth joints. Seal and coat transverse joints.
  - 4. Seal liner surface penetrations with adhesive.
  - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

#### **SECTION 23 0993**

#### **SEQUENCE OF OPERATIONS FOR HVAC CONTROLS**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.
- B. Existing building DDC system is Automated Logic (Clima Tech).
- C. Sequence of operation for:
  - Rooftop Unit (Existing)

#### 1.02 RELATED REQUIREMENTS

- A. Refer to and follow the Multnomah County Facilities Specification Standards (latest version) and its requirements related to controls and the DDC system.
- B. Section 01 81 13 Sustainable Design Requirements
- C. Section 01 74 19 Construction Waste Management and Disposal
- D. Section 01 81 19 Indoor Air Quality Requirements
- E. Section 01 91 13 General Commissioning Requirements
- F. Section 23 0923 Direct-Digital Control System for HVAC.

### 1.03 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
  - 1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
  - State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
  - 3. Include at least the following sequences:
    - a. Start-up.
    - b. Warm-up mode.
    - c. Normal operating mode.
    - d. Unoccupied mode.
    - e. Shutdown.
    - f. Capacity control sequences and equipment staging.
    - g. Temperature and pressure control, such as setbacks, setups, resets, etc.
    - h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.

- i. Effects of power or equipment failure with all standby component functions.
- j. Sequences for all alarms and emergency shut downs.
- k. Seasonal operational differences and recommendations.
- I. Interactions and interlocks with other systems.
- 4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
- 5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
- C. Control System Diagrams: Submit graphic schematic of the control system showing each

control component and each component controlled, monitored, or enabled.

- 1. Label with settings, adjustable range of control and limits.
- 2. Include flow diagrams for each control system, graphically depicting control logic.
- 3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
- 4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
- 5. Include all monitoring, control and virtual points specified in elsewhere.
- 6. Include a key to all abbreviations.
- D. Points List: Submit list of all control points indicating at least the following for each point.
  - 1. Name of controlled system.
  - 2. Point abbreviation.
  - 3. Point description; such as dry bulb temperature, airflow, etc.
  - 4. Display unit.
  - 5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
  - 6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
  - 7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
  - 8. Calculated point (Yes / No); i.e. a "virtual" point generated from calculations of other point values.
- E. Project Record Documents: Record actual locations of components and setpoints of controls,

including changes to sequences made after submission of shop drawings.

# PART 2 PRODUCTS - NOT USED PART 3 EXECUTION

# 3.01 EXISTING ROOFTOP UNIT

A. Match existing sequence of operation, and relocate existing t-stat as shown on plans.

#### **SECTION 23 3100**

# **HVAC DUCTS AND CASINGS**

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Metal ducts.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 8400 Firestopping.
- B. Section 01 81 13 Sustainable Design RequirementsSection
- C. Section 01 74 19 Construction Waste Management and Disposal
- D. Section 01 81 19 Indoor Air Quality Requirements
- E. Section 01 91 13 General Commissioning Requirements
- F. Section 23 0548 Vibration and Seismic Controls for HVAC.
- G. Section 23 0713 Duct Insulation: External insulation and duct liner.
- H. Section 23 3300 Air Duct Accessories.
- I. Section 23 3700 Air Outlets and Inlets: Fabric air distribution devices.

# 1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) ASHRAE Handbook Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASHRAE Std 126 Method of Testing HVAC Air Ducts 2020.
- C. ASTM A36/A36M Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- E. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- F. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable 2016.
- G. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials2023b.

- H. ICC-ES AC193 Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).
- NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.
- J. NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- K. NFPA 91 Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids 2020.
- L. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible 2020.
- M. SMACNA (LEAK) HVAC Air Duct Leakage Test Manual 2012.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements for submittal procedures.
- B. SUSTAINABLE DESIGN SUBMITTALS
  - General: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products in this section and provide documentation as follows:
    - a. LEED Material Information Form: Submit with each Product Data, a related and completed form with quantity (as applicable) and a summary of the applicable environmental attributes pertaining to LEED.
    - b. LEED Product Data: Submit product-specific support documentation with relevant LEED information highlighted, for the applicable environmental attributes identified in the LEED Material Information Form. Support documentation may include but is not limited to: product cut sheets, manufacturer literature, letter from manufacture, certification program documentation, Environmental Product Declaration (EPD), or Safety Data Sheets.
- C. Product Data: Provide data for duct materials.
- D. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for low & medium pressure systems.
- E. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate per appropriate seal class, following SMACNA (LEAK).
- F. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

#### 1.05 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.

C. Deliver all supply ductwork to the job site sealed.

#### **PART 2 PRODUCTS**

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Paints and Coatings: For field applications that are inside the weatherproofing system, use paints and coatings that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.

#### 2.02 GENERAL REQUIREMENTS

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
- C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 3319.
- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
  - 1. Round: Plus or minus 2 in-wc of galvanized steel.
  - 2. Rectangular: Plus or minus 2 in-wc of galvanized steel.
  - 3. Flexible Duct (Fabric and wire): Plus or minus 1 in-wc; see Section 23 3700.
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
  - 1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
    - a. Supply Air: 1 in-wc pressure class, galvanized steel.
    - b. Return and Relief Air: 1 in-wc pressure class, galvanized steel.
    - c. General Exhaust Air: 1/2 in-wc pressure class, galvanized steel.
- F. Duct Fabrication Requirements:
  - Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
  - 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
  - 3. Construct tees, 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 airfoil turning vanes of perforated metal with glass fiber insulation.

- Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
- Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- 6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
- 7. 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.

#### 2.03 METAL DUCTS

#### 2.04 METAL DUCTS

- A. Material Requirements:
  - Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Round Metal Ducts:
  - 1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
  - 2. Round Connection System: Interlocking duct connection system per SMACNA (DCS).
- C. Round Spiral Duct:
  - 1. Round spiral lock seam duct with galvanized steel outer wall.
- D. Connectors, Fittings, Sealants, and Miscellaneous:
  - 1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
  - 2. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
  - 3. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
    - 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.
    - b. VOC Content: Not more than 250 g/L, excluding water.
    - c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
    - d. For Use with Flexible Ducts: UL labeled.
  - 4. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
  - 5. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
    - a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
    - b. Concrete Screw Type Anchors: Complying with ICC-ES AC193.

#### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. Comply with safety standards NFPA 90A and NFPA 90B.

- D. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Buried Supply Duct: Insulate duct runs over 70 feet long with 1 inch thick insulation covered with plastic vapor barrier.
- G. Buried Metal Ductwork: Paint according to SMACNA (DCS).
- H. Buried Metal Ductwork Without Factory Jacket: Paint with one coat and seams and joints with additional coat of asphalt base protective coating.
- I. Buried Metal Ductwork: Encase according to SMACNA (DCS).
  - Provide adequate tie-down points to prevent ducts from floating during concrete placement.
- J. Underground Ducts: Slope to plenums or low pump-out points at 1:500. Provide access doors for inspection.
- K. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- L. Provide openings in ductwork as indicated to accommodate thermometers and controllers.
  Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
- M. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- N. Use double nuts and lock washers on threaded rod supports.
- O. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- P. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- Q. Louver Fit-out:
  - Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.

- 2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.
- R. Fire Partitions: Provide firestopping sealing. See Section 07 8400.
- S. Duct Insulation: Provide duct insulation in compliance with the Oregon energy code and Section 23 0713.

# 3.02 CLEANING

- A. Clean thoroughly each duct system. See Section 23 0130.51.
- B. Clean duct system by forcing air at high velocity through duct to remove accumulated dust.
  Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

#### **SECTION 23 3300**

# **AIR DUCT ACCESSORIES**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Flexible duct connectors.
- F. Volume control dampers.
- G. Miscellaneous Products:
  - 1. Damper operators.
  - 2. Internal strut end plugs.
  - 3. Duct opening closure film.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements
- E. Section 23 0548 Vibration and Seismic Controls for HVAC.
- F. Section 23 3100 HVAC Ducts and Casings.

#### 1.03 REFERENCE STANDARDS

- A. AMCA 500-D Laboratory Methods of Testing Dampers for Rating 2018.
- B. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.
- NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking
   Operations 2021.
- D. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible 2020.
- E. UL 555 Standard for Fire Dampers Current Edition, Including All Revisions.
- F. UL 555S Standard for Smoke Dampers Current Edition, Including All Revisions.

#### 1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

#### B. SUSTAINABLE DESIGN SUBMITTALS

- 1. General: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products in this section and provide documentation as follows:
  - LEED Material Information Form: Submit with each Product Data, a related and completed form with quantity (as applicable) and a summary of the applicable environmental attributes pertaining to LEED.
  - b. LEED Product Data: Submit product-specific support documentation with relevant LEED information highlighted, for the applicable environmental attributes identified in the LEED Material Information Form. Support documentation may include but is not limited to: product cut sheets, manufacturer literature, letter from manufacture, certification program documentation, Environmental Product Declaration (EPD), or Safety Data Sheets.
- C. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- D. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- E. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- F. Project Record Drawings: Record actual locations of access doors and test holes.

#### 1.05 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

#### PART 2 PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.
  - Paints and Coatings: For field applications that are inside the weatherproofing system, use paints and coatings that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.

#### 2.02 BACKDRAFT DAMPERS - METAL

- A. Manufacturers:
  - 1. Nailor Industries, Inc: www.nailor.com/#sle.

- 2. Ruskin Company, a brand of Johnson Controls: www.ruskin.com/#sle.
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving

Equipment: Air moving equipment manufacturer's standard construction.

#### 2.03 DUCT ACCESS DOORS

- A. Manufacturers:
  - Acudor Products Inc, a Division of Nelson Industrial Inc: www.acudor.com/#sle.
  - 2. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
  - 3. Elgen Manufacturing, Inc: www.elgenmfg.com/#sle.
  - 4. Nailor Industries, Inc: www.nailor.com/#sle.
  - 5. Ruskin Company, a brand of Johnson Controls: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.

#### 2.04 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.

#### 2.05 FLEXIBLE DUCT CONNECTORS

- A. Manufacturers:
  - 1. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
  - 2. Duro Dyne.
  - 3. Thermaflex
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. 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/sq yd.
    - a. Net Fabric Width: Approximately 2 inches wide.
  - 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.
- D. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

# 2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Nailor Industries, Inc: www.nailor.com/#sle.
  - 2. NCA, a brand of Metal Industries Inc: www.ncamfg.com/#sle.
  - 3. Ruskin Company, a brand of Johnson Controls: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.

# C. Single Blade Dampers:

- 1. Fabricate for duct sizes up to 6 by 30 inch.
- 2. Blade: 24 gauge, 0.0239 inch, minimum.

#### 2.07 MISCELLANEOUS PRODUCTS

- A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.
- B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
  - 1. Thickness: 2 mils.
  - 2. High tack water based adhesive.
  - 3. UV stable light blue color.
  - 4. Elongation Before Break: 325 percent, minimum.

#### **PART 3 EXECUTION**

#### 3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

# 3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. 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 for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size access door for hand and shoulder access, or as indicated on drawings. Provide minimum 4 by 4 inch size access door for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- F. At equipment supported by vibration isolators, 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 two duct widths from duct take-off.
- H. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

#### **SECTION 23 3700**

#### **AIR OUTLETS AND INLETS**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. Diffusers:
  - Perforated ceiling diffusers.
- B. Rectangular ceiling diffusers.
- C. Registers/grilles:
  - 1. Ceiling-mounted, exhaust and return register/grilles.
  - 2. Ceiling-mounted, supply register/grilles.
  - Wall-mounted, exhaust and return register/grilles.
- D. Duct-mounted supply and return registers/louvers.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 81 13 Sustainable Design Requirements
- B. Section 01 74 19 Construction Waste Management and Disposal
- C. Section 01 81 19 Indoor Air Quality Requirements
- D. Section 01 91 13 General Commissioning Requirements
- E. Section 09 9123 Interior Painting: Painting of ducts visible behind outlets and inlets.

# 1.03 REFERENCE STANDARDS

- A. AHRI 880 (I-P) Performance Rating of Air Terminals 2017.
- B. AMCA 500-L Laboratory Methods of Testing Louvers for Rating 2012, with Editorial Revision (2015).
- C. AMCA 550 Test Method for High Velocity Wind Driven Rain Resistant Louvers 2022.
- D. ASHRAE Std 70 Method of Testing the Performance of Air Outlets and Air Inlets 2006 (Reaffirmed 2021).
- E. ASHRAE Std 130 Methods of Testing Air Terminal Units 2016.
- F. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.
- G. NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- H. SMACNA (ASMM) Architectural Sheet Metal Manual 2012.
- I. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible 2020.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 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.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

#### 1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

# **PART 2 PRODUCTS**

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements, for all applicable products.
  - Adhesives and Sealants: For field applications that are inside the weatherproofing system, use adhesives and sealants that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications.
  - Paints and Coatings: For field applications that are inside the weatherproofing system, use paints and coatings that meet VOC emissions evaluation and VOC limits of the California Department of Public Health (CDPH) Standard Method v1.2–2017, and meet the VOC content evaluation of California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.

#### 2.02 MANUFACTURERS

- A. Krueger-HVAC, Division of Air System Components: www.krueger-hvac.com/#sle.
- B. Price Industries: www.price-hvac.com/#sle.
- C. Ruskin Company: www.ruskin.com/#sle.
- D. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.
- E. Tuttle and Bailey: www.tuttleandbailey.com/#sle.
- F. Nailor.
- G. Greenheck

#### 2.03 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, adjustable pattern, stamped, multi-core diffuser to discharge air in four way pattern.

- B. Connections: As indicated on drawings.
- C. Fabrication: Steel with baked enamel finish.
- D. Color: As selected by Architect from manufacturer's full range.

# 2.04 CEILING SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable curved blades (or louver face) to discharge air along face of grille, four way deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Construction: Made of aluminum extrusions with factory enamel finish.
- D. Color: As selected by Architect from manufacturer's full range.

# 2.05 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Frame: 1-1/4 inch margin with countersunk screw mounting.
- B. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- C. Color: To be selected by Architect from manufacturer's full range.

#### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black, see Section 09 9123.

# SECTION 260000 GENERAL ELECTRICAL REQUIREMENTS

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

A. The Section includes general electrical requirements.

# 1.02 PERMITS, FEES, AND SERVICE CHARGES

- The CONTRACTOR shall obtain all electrical permits required to complete the work and pay all associated fees.
- B. The CONTRACTOR shall coordinate and provide for the installation and operation of franchise utility service (including any telephone and/or leased lines specified) as required during construction, startup, testing, and operation of the work until substantial completion.

### 1.03 CONTRACTOR'S RESPONSIBILITY FOR FIELD VERIFICATION OF EXISTING CONDITIONS

- A. The CONTRACTOR shall be responsible for performing field verification of the existing conditions prior to bidding. The nature of this work inherently requires field observation to understand the existing conditions and scope of work.
- B. Failure to observe the existing conditions or ignorance of existing conditions shall the responsibility of the CONTRACTOR alone. Additional services shall not be authorized due to the CONTRACTOR'S lack of understanding of the existing conditions.

# 1.04 CONTRACTOR'S RESPONSIBILITY FOR SHUTDOWNS AND MAINTAINING EXISTING SYSTEMS

- A. Shutdowns of any Division 26, 27, or 28 system shall be coordinated with the OWNER seven (7) work days prior to performing the shutdown. The CONTRACTOR shall provide the OIENER with a written schedule identifying the system, duration, and impact on the OWNER'S facility. Shutdowns shall be confirmed with OWNER 48 hours prior to performing the shutdown.
- B. Existing Division 26, 27, and 28 systems not impacted by the work in this project shall be protected and maintained during construction. Any system not identified on the Drawings or within these Specifications shall be brought immediately to the attention of the ENGINEER and OWNER.
  - 1. The CONTRACTOR shall be responsible for bearing the cost of repairing or restoring all electrical systems that are disrupted or damaged during construction. The systems shall be repaired and restored to their original condition.

# 1.05 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. Riser and other diagrams are schematic and are intended to show the approximate location of equipment, and the general alignment of conduits and piping, and shall not be used for obtaining quantities. Dimensions given on the plans shall take precedence over scaled dimensions and all dimensions whether in figures or scaled, shall be verified in the field.
- B. The electrical drawings do not show complete details of the site conditions. The CONTRACTOR shall check actual conditions.
- C. The exact location of apparatus, fixtures, equipment, conduit and piping shall be ascertained by the CONTRACTOR in the field, and the work shall be laid out accordingly. Should the CONTRACTOR fail to ascertain such locations or coordinate with work performed by other trades, the work shall be changed at no additional cost to the OWNER when so ordered by the ENGINEER. The ENGINEER reserves the right to make minor changes in the location of conduit, piping and equipment up to the time of installation without additional cost to OWNER.
- D. CONTRACTOR shall provide all labor, materials, equipment, machinery, and tools necessary to provide all electrical equipment specified and shown on the Drawings. All items not specified in detail or shown on the Drawings but necessary for complete installation shall be provided by the CONTRACTOR.

#### 1.06 SUBSTITUTION REQUESTS

- A. All substitution requests shall meet the following:
  - 1. Shall be received by the ENGINEER no later than ten (10) business days prior to date of final addendum during the bid period. Submittals that do not meet this requirement shall be returned as LATE and shall not be considered for a substitution request.
  - Shall have clearly labeled and marked-up product data, indicating the features and part numbers.
  - 3. Submittals shall be individually labeled with the reference key note number or luminaire identification tag for which the substitution request is being made. Generic product catalog data or unmarked and or unlabeled substitution requests shall not be considered and shall be returned as INCOMPLETE to the CONTRACTOR.
  - 4. All product data identified as OWNER Standard shall not be eligible for a substitution request.

# 1.07 SUBSTITUTION REQUESTS FOR MECHANICAL, HVAC, PROCESS, OR OTHER EQUIPMENT IMPACTING THE ELECTRICAL DESIGN

- A. The CONTRACTOR shall be responsible for including the cost impact to the electrical systems for substitution requests and/or value engineering for mechanical, HVAC, process, or other equipment made by other trades. The costs to the overall substitution request or value engineering solution must be included in the total number provided to the OWNER. The CONTRACTOR is responsible for coordinating the substitution requests or value engineering proposals made by other trades.
- B. Any substitution request and/or value engineering solution which impacts the electrical design but does not include the costs shall be unacceptable.
- C. Failure of other subcontractors to include the electrical cost impact shall not be the basis for a change order. The CONTRACTOR shall be responsible for coordinating the total costs of all substitution requests and/or value engineering solutions prior to presenting them to the ENGINEER or OWNER.

#### 1.08 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260000.A01) typewritten in the upper right-hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.
- B. Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:
  - 1. Submittals shall include information and literature as required for all equipment and materials provided under this and related sections.

- 2. Shop Drawings: Shop drawings shall include the following along with any special requirements listed in the individual Specification Sections:
  - a. Installation instructions and drawings.
  - b. Wiring schematics with termination point identification.
  - c. Motor information.
  - d. Materials of construction.
  - e. Manufacturer's name and model.
  - f. Manufacturer's catalog data.
  - g. Supplementary structural framing for electrical equipment including design loads, member size and location. When supplementary framing is indicated, verify that dimensions are suitable for the equipment furnished. Provide additional strength when equipment furnished is heavier than that specified.
- Manufacturers' Literature: Literature indicating the compliance of the products with the Specifications shall be included with all submittals. This shall include catalogs and other descriptive bulletins. Relevant portions of the literature shall be clearly identified by highlighting or underlining.
- 4. Test Logs: The CONTRACTOR shall submit test logs as outlined below and as specified in subsequent electrical sections and drawings.
  - A log of the complete results of tests for shorts and grounds for each circuit. All circuits and tests shall be clearly identified.
  - b. A log of complete results of insulation resistance measurements of each circuit. All circuits and tests shall be clearly identified.
- 5. Operation and maintenance information for all equipment furnished and/or installed.
- Programming instructions for any controllers or other programmable equipment. Copies of the any required software, including registration cards, shall be provided with the O&M manuals.
- C. Deferred Submittals.
  - 1. Submittals for seismic bracing/anchoring and wind loads shall be a deferred submittals. Engineering of the seismic bracing and anchoring system shall be provided by a licensed Engineer in the State of Oregon. Submittals shall include calculations and drawings, including connection types/materials/sizes, load, maximum load, dimensions, etc
- D. The CONTRACTOR shall indicate on the submittals all variances from the Specifications.
- E. Record Drawings. After the completion of construction, the CONTRACTOR shall provide one set of "as-built" drawings to the ENGINEER as specified herein showing the location of buried conduits and all changes or deviations from the original drawings.
- F. After the completion of construction, a printout and electronic copy of any programming and/or set-points for controllers, PLCs, meters or other programmable equipment, including VFDs.
- G. Final inspection certificates shall be submitted prior to final payment.

## 1.09 COORDINATION OF WORK

- A. The CONTRACTOR shall plan his work in coordination with the other trades and with the power and telephone utility authorities.
- B. The CONTRACTOR shall field verify all dimensions of equipment to be installed or provided by others so that correct clearances and connections may be made between the work installed by the CONTRACTOR and equipment installed or provided by others.
- C. The CONTRACTOR shall arrange all conduit runs so that they do not interfere with piping, structural members, etc.

- D. All working measurements shall be taken from the sites, checked with those shown on the drawings, and if they conflict, reported to the ENGINEER at once, and before proceeding with the work. Should the CONTRACTOR fail to comply with this procedure, he shall alter his work at his own expense as directed by the ENGINEER.
- E. No additional payments will be allowed where obstructions in the work of other trades, or work under this contract requires offsets to conduit runs.
- F. The CONTRACTOR is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.
- G. The CONTRACTOR shall provide all temporary power necessary for existing site equipment and for all construction needs.

## 1.10 EXISTING SYSTEMS

- A. Existing systems within the project, whether or not they are shown on the Drawings, shall be protected and maintained during construction. The Contractor shall not damage, disrupt, or shutdown the existing systems without written approval from the OWNER.
- B. Shutdowns shall be coordinated and scheduled with the OWNER.

#### 1.11 PROJECT ELECTRICAL WORK REQUIREMENTS

- A. Provide all Electrical Work in accordance with the following table, unless otherwise specifically indicated on the Drawings.
- B. Provide NEMA 3R enclosures and supports, and RGS conduit type for all Electrical Work not included in the following table unless otherwise specifically indicated on the Drawings. Conduit type definitions are listed under Section 260533, Raceways and Boxes for Electrical Systems.
- C. Reference Section 16070 Hangers and Supports and 260533 Raceways and Boxes for detailed requirements.

PROJECT AREA	NEMA ENCLOSURE TYPE	EXPOSED CONDUIT TYPE	ENVIRONMENT W = WET D = DAMP C = CLEAN/DRY X = CORROSIVE H = HAZARDOUS	SUPPORT MATERIALS
Interior	NEMA 1	EMT	С	GALV

## 1.12 SUPERVISION

A. The CONTRACTOR shall maintain adequate supervision of the work and shall have a responsible person in charge at the site during all times that work under this contract is in progress, or when necessary for coordination with other work.

## **1.13 CODES**

A. Work shall conform to the National Electrical Code (NEC), and State Codes and other applicable codes, even though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality for materials and workmanship.

#### 1.14 CONTRACTOR'S RECORD DRAWINGS & AS-BUILTS

A. The CONTRACTOR shall maintain a neatly marked set of record drawings showing the locations of all buried conduits and other utilities encountered or installed during construction. The final locations of panels, field mounted instruments and panels, terminal boxes, junction boxes, receptacles, light switches and other materials included in the work shall be shown, as well as conduit routing between them to the extent it differs from the design drawings. Record drawings shall be kept current with the work as it progresses and shall be subject to inspection by the OWNER's Representative at any time. Failure to keep field record drawings current may result

- in the issuance of a stop work order or delay in the processing of pay requests until the record drawings are made current.
- B. The CONTRACTOR shall provide one complete set of as-built electrical schematics for all panels and equipment provided, including PLC I/O schematics as applicable, panel elementary diagrams, interconnecting wiring diagrams, wire numbers, termination strip locations and numbers. These shall be in the same format and style as those in the Contract Documents and submittal requirements.
- C. All information shown on the CONTRACTOR's field record drawings and as-built schematics shall be subject to verification by the OWNER's Representative. If significant errors or deviations are noted by the OWNER's Representative, new as-builts shall be completed at the CONTRACTOR's expense.

#### **PART 2 PRODUCTS**

## 2.01 PORTABLE OR DETACHABLE PARTS

- A. The CONTRACTOR shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adapters, blocking chips and inserts until completion of his work.
- B. These parts shall be delivered to the ENGINEER and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the CONTRACTOR's request for final payment.
- C. All equipment of the same type and capacity shall be by the same manufacturer.

#### 2.02 NEW PRODUCTS

- A. All products shall be new without defects and covered by Manufacturer's warranty. Products shall be re-used only where indicated on the Drawings.
- B. All products shall be listed, labeled, and certified by a testing agency approved by the state of Oregon.
- C. All equipment of the same type and capacity shall be by the same manufacturer.

## **PART 3 INSTALLATION**

#### 3.01 IDENTIFICATION

A. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

#### 3.02 WORKMANSHIP & COORDINATION

- A. All work shall be performed by personnel skilled in the particular trade in a workmanlike manner. Workmanship shall conform to the standards of the NEC and the National Electrical Installation Standards (NEIS).
- B. The ENGINEER shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgment any material or equipment has not been properly installed or finished, the CONTRACTOR shall replace the material or equipment whenever required and reinstall it in a manner entirely satisfactory to the ENGINEER without any increase in cost to the OWNER.
- C. The CONTRACTOR shall coordinate and verify the installation of all equipment furnished by him to other trades, or equipment provided and installed by other trades that is connected to the electrical or control systems. Work shall include the furnishing of all labor, materials, and equipment required for the installation of a complete and operable system as hereinafter specified and as indicated on the drawings. The Contract Documents are complementary and what is called for by anyone shall be as binding as if called for by all. Unless otherwise specifically stipulated, the term "furnished and installed complete" shall be considered a part of this section.
- D. Controls and systems shall be complete with transformers, switches, relays, contactors, control valves, control devices, instrument piping, fittings, valves, control wiring, thermometers, pressure gauges, thermostats, damper operators, miscellaneous control cabinets to fill the intent

- of the Specifications and shall provide control for the various units and systems. All control valves and motorized dampers shall be provided with position indicators.
- E. Unless otherwise specified or shown on the drawings, switches or relays shall be installed in, or adjacent to the motor starter or other electrical device to which they are to be connected. Control and interlock wiring shall be included as necessary from breakers specified herein or shown on the drawings.
- F. Each control schematic intended to control a series of motor operated louvers, fans, and thermostats shall contain a switch for maintenance to meet the NEC requirements regarding disconnect switches for motors. This switch shall be local if any unit controlled is out of sight of the switch. This switch shall disconnect all power to all motor operated devices within the circuit.

#### 3.03 TEMPORARY HEATING, LIGHTING AND POWER

- A. The CONTRACTOR shall provide all heat, lighting and power required to construct and protect the work until the work is placed in service by the OWNER for beneficial use of the OWNER. Temporary heaters shall be provided as required to keep the work area and all new electrical components dry).
- B. The source for temporary power shall be from the electric utility or OWNER approved CONTRACTOR supplied auxiliary power units. The installation for electric power shall meet the requirements of local authorities and of OSHA.
- C. The CONTRACTOR shall obtain all permits and pay all costs for connecting temporary power service at no expense to the OWNER.

## 3.04 SUPPORT BACKING

A. Provide any necessary backing required to properly support all fixtures and equipment installed under this contract.

## 3.05 CUTTING, PATCHING AND FRAMING

- A. The CONTRACTOR shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.
- B. Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-metallic non-shrink grout.
- C. Cutting, fitting repairing and finishing of carpentry work, metal work, or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around the holes.

#### 3.06 ACCESS PANELS

A. The CONTRACTOR shall provide all access panels in hard ceilings to allow NEC-required access to junction boxes, pull boxes, and light fixtures. The CONTRACTOR shall submit to the ENGINEER for approval floor plans (1/8" = 1'-0" scale minimum) which clearly indicate proposed access panel locations.

#### **3.07 TESTS**

- A. The CONTRACTOR shall furnish all labor, material, instruments and tools to make all connections for testing of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly prior to the acceptance of the work. All protective devices shall be operative during testing of equipment. The tests shall be made under the supervision of the ENGINEER. All deficiencies or unsatisfactory conditions as determined by the ENGINEER or inspecting authorities shall be corrected by the CONTRACTOR in a satisfactory manner at his own expense.
- B. After visual inspection of joints and connections and the application of tape and other insulating materials, all sections of the entire wiring system shall be thoroughly tested for shorts and

- grounds. A log of results for each circuit shall be kept by the CONTRACTOR and presented to the ENGINEER.
- C. A phase rotation check shall be made to demonstrate that all power receptacles, service feeders, main power feeders and auxiliary power generators have the same A B C phase rotation and ground relationships.
- D. Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc., sufficiently to demonstrate proper installation and electrical connections. Control and emergency conditions shall be artificially simulated where necessary for complete system or subsystem.

#### 3.08 CLEANING AND TOUCH-UP PAINT

- A. Upon completion of work, all electrical equipment shall be cleaned.
  - Vacuum all dirt, metal shavings, and foreign materials from all enclosures. The use of compressed air shall not be acceptable.
  - 2. All stains, dirt, and fingerprints shall be removed from switchboards, motor control centers, panelboards, light fixtures, enclosures, and all other electrical equipment covers.
- B. Provide touch-up paint on equipment that has been scraped, scratched, or chipped during construction. Paint color shall match color of equipment.

## 3.09 COORDINATION OF STARTUP AND ADJUSTING, COMMISSIONING, DEMONSTRATION AND TRAINING, AND OPERATION AND MAINTENANCE DATA

A. Reference 260110 - Operation and Maintenance Data for detailed requirements.

## SECTION 260108 ELECTRICAL TESTING

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

A. The Section includes electrical and control testing forms and requirements.

#### 1.02 REFERENCES

- A. National Fire Protection Association (NFPA):
  - 1. 70, National Electrical Code (NEC).

## 1.03 SEQUENCING

- A. ENGINEER shall issue written acceptance of the following certifications submitted by the CONTRACTOR before utility power is supplied to conductors, cables, or equipment.
  - 1. Megger Test.
  - 2. Continuity Test.
- B. CONTRACTOR shall verify to ENGINEER that every function of the electrical, measurement, and control systems are operating properly.

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

#### **PART 3 EXECUTION**

#### 3.01 FIELD QUALITY CONTROL

- A. Site Tests, Inspection.
  - CONTRACTOR shall be responsible to become familiar with the test and certification requirements of the Contract Documents for this project. It is the intent of these requirements that the Work will be systematically checked to verify that the functions required or implied, work properly to ensure safety for the personnel, environment, and equipment associated with the Work.
  - CONTRACTOR shall complete the certification forms that are supplemental to this section and submit the forms to ENGINEER for approval.
  - All site test and inspection certificates and schedules shall be contained in a 3-ring binder(s).
    - a. Size 8½ inches by 11 inches.
    - b. Paper: 20-pound minimum, white for typed pages.
    - c. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
    - d. Provide each manual with title page to include "Process Electrical Testing", typed table of contents with consecutive page numbers. Where more than one binder is used, consecutively title each with a volume number. The first binder shall be labeled Volume 1 and consecutively numbered as required to include all test documentation.
    - e. Tab sections for each required section of testing and acceptance certification.
  - 4. CONTRACTOR shall notify ENGINEER seven days in advance of scheduled testing and facilitate the witnessing of those tests by ENGINEER.
  - 5. CONTRACTOR shall provide ENGINEER with current as-built documentation for electrical and measurement and control commissioning with submittal of test certification.
    - Systems operating at or above 200-volts to ground or more shall be included in the Megger Test Certification. Minimum duration for each test shall be one minute, at 1000 VDC, and minimum acceptable results shall be 50 mega ohms.
    - Conductors and cables shall be included in the Continuity Test Certification. No continuity to ground is the only acceptable result of the test.

- c. Conductors, cables, or equipment failing to meet the minimum requirements shall be replaced with new. Repair will not be acceptable.
- d. Each individual instrument shall have an Instrument Calibration Certificate. The calibration shall operate within the tolerances specified by the manufacturer of the instrument and the Contract Documents.
- e. Installed motors shall have a written Motor Insulation Certificate for all the motors listed in the Drawings for the Work. Motors failing test shall be tagged and locked out from operation.

## 3.02 SUPPLEMENTS

B. Schedule 260108 - A; Continuity Test Certificate.

# SUPPLEMENT 260108 - A CONTINUITY TEST CERTIFICATE

				Project Number:		
Test Equipment Manufacturer:		Model Number:	Model Number:		Project Name:	
		Serial Number:	er: Accepted By:			
Test Equipment Last Calibration	า Date:			Date:		
Testing Personnel:		Calibration Certificate:	Calibration Certificate:		Drawing Reference:	
		Test Date:	Test Date:		Title:	
				Tag:		
				. I		
Permanent Tag Number	Function	Temporary Tag Number	Devi	ice ID Number	Ohms to Ground	

# SUPPLEMENT 260108 - A CONTINUITY TEST CERTIFICATE

		Project Number: 12345	
Test Equipment Manufacturer: Fluke	Model Number: 53G	Project Name: Water Division	
Test Equipment Last Calibration Date: Unknown	Serial Number: 638842	Accepted By: S.E. Davis	
Testing Personnel: John Doe	Calibration Certificate: <i>No</i>	Date: 01/01/2003  Drawing Reference: <i>E-501</i>	
	Test Date: 12/30/02	Title: Conduit Schedule	
Permanent Tag Number Function		evice ID Number Ohms to Ground	
016-34-PNL Level Indicator	34	016-34	
	IVI I		

## SECTION 260110 OPERATION AND MAINTENANCE DATA

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. Definitions.
  - 2. General requirements.
  - 3. Submittal procedures.
  - 4. Content requirements for manuals.
  - Supplements.

#### 1.02 DEFINITIONS

- A. Maintenance Operation.
  - 1. Routine operation required to ensure satisfactory performance and longevity of the equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands and other routine adjustments.

#### 1.03 GENERAL REQUIREMENTS

- A. Provide operation and maintenance data for items listed in Supplement 260110 A, "Schedule of Equipment Requiring Operation and Maintenance Data".
- B. In addition to the composite of manuals for individual equipment items or systems, provide a consolidated summary of required routine scheduled maintenance and scheduled preventative and predictive maintenance for the project, with reference to where detailed information may be found. Include safety information and emergency plans and procedures. The summary shall be in a separate binder from the other equipment and system binders.
- C. Comply with the following format relating to the Operation and Maintenance Manual:
  - 1. All binders shall be "D" ring type with one-touch ring locking mechanism.
  - 2. Overlay material shall be crystal clear poly.
  - 3. Binders shall be black poly.
  - 4. Binders shall be nominally sized for 75 percent fill per volume with a maximum binder depth of four (4) inches and a minimum depth of one (1) inch.
  - 5. Submit example binder cover sheet for approval by ENGINEER.
  - 6. Submit example spine insert for approval by ENGINEER.
  - 7. Paper: twenty (20) pound minimum, white for typed pages, 8.5 x 11 inches.
  - 8. Text: Manufacturer's printed data, or neatly typewritten. Facsimiles transmitted via fax machine shall be unacceptable.
  - 9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
  - 10. Provide fly-leaf for each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment. Provide with heavy section dividers with numbered plastic index tabs.
  - 11. Provide each manual with a title page, typed table of contents with consecutive page numbers. Plan contents of entire set, identified by volume number, in each binder.
  - 12. Material shall be suitable for reproduction with quality equal to the original. Photocopying of material will be acceptable except for material containing photographs.
  - 13. Table of contents shall be neatly typewritten, arranged in a systematic order, containing as a minimum the following data:

- a. CONTRACTOR, name of responsible principle, address and telephone number.
- b. List of each product required to be included and indexed to content of each volume.
- c. List of each product, name, address and telephone number of subcontractor, supplier, installer and maintenance contractor as appropriate.
- d. Provide local source and phone number of supply for parts and replacement.
- e. Identify each product by product name, model number and other identifying numbers or symbols as set forth in the Contract Documents.

#### 14. Product data:

- a. Include only those sheets that are pertinent to the specific product provided.
- b. Clearly annotate each sheet to identify specific product or part installed, data applicable to the installation and delete references to inapplicable information.
- 15. Drawings; supplement product data with drawings as necessary to clearly illustrate the following:
  - a. Relationship of component parts of equipment and systems.
  - b. Control and flow diagrams.
  - c. Coordinate drawings with project record documents to assure correct illustration of completed installations.
  - d. CONTRACTOR shall not use project record documents as maintenance manual drawings.
  - e. Provide reinforced punched binder tabs.
  - f. Reduced 11 x 17 inch drawings shall be folded to 8.5 x 11 inch format.
  - g. Where reduction to 11 x 17 inch is impractical, fold and place the 8.5 x 11 inch envelopes that are bound in the binder.
  - h. Identify specification Section and product on drawings and envelopes.

#### 1.04 SUBMITTAL PROCEDURE

- A. Compile the required data, arrange as specified herein and insert data in the number of volumes necessary. The volumes shall be submitted as a complete set. Partial or incomplete manuals shall be rejected by the ENGINEER.
- B. Preliminary Manuals:
  - 1. Submit three copies to ENGINEER for review and approval well before the starting and adjusting activities commence.
  - 2. If accepted:
    - a. One copy will be returned to the CONTRACTOR.
    - b. One copy will be forwarded to the OWNER.
    - c. One copy will be retained in the ENGINEER's file.
  - If rejected:
    - Two copies will be returned to the CONTRACTOR with ENGINEER's comments for revision.
    - b. One copy will be retained in the ENGINEER's file.
    - CONTRACTOR shall be required to resubmit three revised preliminary manuals for ENGINEER's review.
- C. Final Manuals:
  - 1. Submit two copies to ENGINEER for review and approval before final completion.
  - 2. If accepted:
    - a. CONTRACTOR will be so notified.

b. CONTRACTOR shall provide a complete set of the final manual on CD-ROM. Data written specifically for the manual will be presented in MS Word format. Manufacturer data (per-printed data) will be presented in Adobe PDF format.

## 3. If rejected:

a. At the ENGINEER's discretion either all but one copy of the manuals will be returned to the CONTRACTOR for revisions or all copies will be retained by the ENGINEER and the necessary revision data will be requested from the CONTRACTOR.

## 1.05 CONTENT REQUIREMENTS FOR MANUALS

- A. The Operation and Maintenance Manuals shall normally consist of no less than four volumes outline below.
- B. The Operation and Maintenance Manuals shall normally consist of no less than four volumes outline below.
  - 1. All sheets in volume 1 shall have sheet protectors.
  - 2. All materials in volume 1 shall be copied onto a CD and provided to the ENGINEER.
  - 3. Include instructions and procedures for handling, storage, maintenance during storage, assembly, erection, installation, adjusting, testing, operating, shut down in emergency, troubleshooting, maintenance, interface with other equipment and as may otherwise be required.
  - 4. Organize in a consistent format under separate heading for each different procedure.
  - 5. Provide a logical sequence of instructions for each procedure.
  - Provide an information sheet for the OWNER's personnel which include the proper procedures in the event of a failure and instances that might affect the validity of warranties or bonds.
  - 7. Content for each unit (or common units) and system:
    - a. Start-up and break-in routine and normal operating instructions.
  - 8. Operating Procedures:
    - a. Start-up and break-in routine and normal operating instructions.
    - b. Test procedures and results of factory tests where required.
    - c. Regulation, control, stopping and emergency instructions.
    - d. Description of operation sequence by control manufacturer.
    - e. Shutdown instructions for both short and extended durations.
    - f. Summer and winter operating instructions as applicable.
  - 9. Maintenance and Overhaul Procedures:
    - a. Routine operations.
    - b. Guide to troubleshooting.
    - c. Disassembly, removal, repair, reinstallation, and reassembly.
  - 10. Installation Instructions including alignment, adjusting, calibrating, and checking.
  - 11. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list and diagrams required for maintenance.
  - 12. Parts list by generic title and manufacturer's part number.
  - 13. Name, location and telephone number of nearest supplier and spare parts warehouse.
  - 14. Where applicable identify installed spares and other provisions for future work (e.g. reserved panel space, unused components, wiring and terminals).
  - 15. Manufacturer's printed operating and maintenance instructions.

- 16. Charts of valve tag numbers along with the location and function of each valve.
- 17. Manufacturer's certifications including calibration data sheets and specified calibration procedures or methods for installed equipment.
- 18. Warranty forms and information for all installed equipment provided by the CONTRACTOR.
- 19. Circuit directories for all panels including electrical, control and communication.
- 20. List of adjustable electrical relay settings, control and alarm settings.
- C. Volume 2 Equipment Manuals.
  - 1. Table of contents shall have a sheet protectors.
  - 2. Table of contents and index sheets shall be of colored card stock.
  - 3. Manuals for individual equipment shall not be divided between separate binders.
  - 4. List function, normal operation, characteristics and limiting conditions.
  - 5. Complete commercial part number and nomenclature of replaceable part.
  - 6. Maintenance procedures including routine operations, guide to troubleshooting and adjustments.
  - 7. Manufacturer's printed operation and maintenance instructions.
  - 8. List of manufacturer's spare parts and recommended quantities to be maintained in storage.
  - 9. Contents for Maintenance Summary Manual:
    - Compile individual maintenance summaries for each applicable equipment item, respective unit or system and for components or subunits.
    - b. Format shall include use of the Supplement 260110 B "Maintenance Summary" provided. Each Maintenance Summary may take as many pages as required. Supplement shall be typewritten and shall include detailed lubrication instructions and diagrams showing points to be greased or oiled, recommended type, grade and temperature range of lubricants and frequency of lubrication.
    - c. Include a list and quantity of manufacturer's recommended consumable and spare parts that should be stored on site.
- D. Volume 3 Drawings.
  - 1. As-built drawings associated with the project shall be provided. This includes, but is not limited to, manufacturers supplied drawings. All drawings shall be provided on 11 x 17 inch sheets folded to 8.5 x 11 inch size and bound in this volume. A complete and detailed index shall be provided that includes a list of all drawings in the volume and the drawings shall be tabbed in a fashion that provides clear and concise identification.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION 3.01 SUPPLEMENTS

A. Supplement 260110 – A, "Schedule of Equipment Requiring Operation and Maintenance Data".

## SUPPLEMENT 260110 - A

## SCHEDULE OF EQUIPMENT REQUIRING OPERATION AND MAINTENANCE DATA

ITEM		MANUAL (M)	
NO.	SECTION	DATA SHEET (D)	DESCRIPTION
1.	260923	D	LIGHTING CONTROL DEVICES
2.	265100	D	INTERIOR LIGHTING
3.	283000	D	FIRE DETECTION AND ALARM
4.			
5.			
6.			
7.			
8.			

**END OF SUPPLEMENT** 

## SECTION 260502 MINOR ELECTRICAL DEMOLITION

## **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

- A. The Section includes:
  - Removal of existing electrical equipment, wiring and conduit in areas to be remodeled.
     Removal of designated construction, dismantling, cutting and alterations for completion of the Work.
  - 2. Disposal of materials.
  - 3. Storage of removed materials.
  - 4. Identification of utilities.
  - 5. Protection of items to remain as identified in the schedules at the end of this Section.
  - 6. Removal of temporary electrical equipment prior to completion of the Work.

#### 1.02 CLOSEOUT SUBMITTALS

- A. Refer to the Contract Documents for general closeout submittal requirements.
- B. Project Record Drawings shall be provided that record actual locations of capped conduits and equipment abandoned in place.

#### 1.03 SEQUENCING

A. Sequencing of the Work shall be as noted in the Contract Documents.

#### 1.04 SCHEDULING

- Refer to the Contract Documents.
- B. Coordinate the schedule of noisy, malodorous and dusty work with the ENGINEER.

## 1.05 COORDINATION

- A. Refer to Contract Documents.
- B. Conduct demolition to minimize interference with adjacent or occupied areas.
- C. Coordinate demolition work with other trades.
- D. Coordinate and sequence demolition so as not to cause shutdown or interruption of operation of surrounding areas.
- E. Arrange timing of shutdowns with the OWNER. Do not shutdown any utility service without prior written approval. Keep shutdown periods to a minimum.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify wiring and equipment scheduled for demolition serve only abandoned process and facilities.
- B. Verify termination points for demolished services.

## 3.02 DEMOLITION

- A. Items scheduled for demolition shall be legally disposed of by the CONTRACTOR.
- B. Remove exposed abandoned conduit.
- C. Disconnect electrical systems in walls, floors and ceilings scheduled for removal.
- D. Reconnect equipment being disturbed by renovation work and required for continued service.

- E. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, switches, receptacles, conduit, and conductors which are not part of the completed project.
- F. Install temporary wiring and connections necessary to maintain existing systems in service during construction.
- G. Remove, relocate and extend existing installations to accommodate new construction.
- H. Repair adjacent construction and finishes to original condition that are damaged during demolition and extension work.
- I. Remove abandoned grounding and bonding components, fasteners, supports and electrical identification components. Cut embedded support elements flush with wall, floors and ceilings.
- J. Clean and repair existing equipment scheduled to be reinstalled.
- K. Protect and retain power to existing active equipment remaining.
- L. Cap abandoned empty conduit at both ends.
- M. Provide water-tight, knockout seals in panels, enclosures, gutters, or junction boxes where conduit has been removed.
- N. Seal concrete penetrations, originally occupied by removed conduit, with suitable grouting material.

#### 3.03 REUSABLE ELECTRICAL EQUIPMENT

- A. Unless specifically identified for reuse, no used electrical equipment, conduit, conductors, components of any sort scheduled for demolition, disposal or salvage shall be installed for reuse on the project.
- B. Electrical equipment identified specifically as being reused on the project shall be cleaned and protected until such time as it is reinstalled.

#### **SECTION 260519**

#### LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. The section includes the requirements for conductors and cables used to conduct potentials of 600 volts and less.
  - 2. All conductors and cables shall be installed in conduit or approved raceways regardless of which Division the conductors or cables are specified.

#### 1.02 REFERENCES

- A. The following is a list of Standards which may be referenced in the Section.
  - 1. American Society for Testing and Materials (ASTM).
    - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.
  - 2. National Electrical Contractors Association, Inc. (NECA): National Electrical Installation Standards (NEIS).
  - 3. National Electrical Manufacturers Association (NEMA).
    - a. WC 3, Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
    - b. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
    - c. WC 7, Cross Linked-Thermostetting Polyethylene Wire and Cable for the Transmission and Distribution of Electrical Energy.
    - d. WC 55, Instrumentation Cables and Thermocouple Wire.
  - 4. National Fire Protection Association (NFPA). 70, National Electrical Code (NEC).
  - 5. Underwriters Laboratories, Inc. (UL).
    - a. 13, Standard for Power-Limited Circuit Cables.
    - b. 44. Standard for Safety Rubber-Insulated Wires and Cables.
    - c. 62, Standard for Safety Flexible Cord and Fixture Wire.
    - d. 510, Standard for Safety Insulating Tape.
    - e. 854, Standard for Safety Service-Entrance Cables.
    - f. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical Fiber Cables Used in Air Handling Spaces.
    - g. 1277, Standard for Safety Electrical Power and Control Tray Cables.
    - h. 1581, Standard for Safety References for Electrical Wires, Cables and Flexible Cords

#### 1.03 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260519.C01) typewritten in the upper right-hand corner of the submittal. The submittals within each Section tab shall

- be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
- 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
- 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete

#### B. Product Data.

- 1. Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, weight, and related information for each item specified in PART 2 PRODUCTS

#### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

## A. Single Conductors (260519.C01).

- 1. Conductors shall be rated for 600 volts and conform to applicable requirements of NEMA.
- 2. Conductors shall be stranded copper. Conductors shall be permitted to be aluminum only where shown on the drawings.
- 3. Insulation type shall be THWN-2.
- 4. Conductors shall be sized per the Drawings and the NEC, whichever is greater.
- 5. Rome Cable Corporation, Southwire Company, Okonite Company, or approved equal.

#### B. Flexible Cords (260519.C05).

- 1. Conductors shall be rated for 600 volts and conform to applicable requirements of NEMA.
- 2. Conductors shall be stranded copper.
- 3. Flexible cord sheath shall be type SOOW, rated for 90 degree C and high-visibility yellow.
- 4. Southwire Company, General Cable, Electri-Cord Manufacturing Company, or approved equal.

## C. Metal Clad (MC) Cables (260519.C25).

- 1. Shall be rated for 600 volts and conform to applicable requirements of NEMA.
- 2. Conductors shall be stranded copper.
- 3. Insulation type shall be THHN/THWN.
- 4. Armor material shall be aluminum.
- 5. Southwire or approved equal.

## 2.02 ACCESSORIES

## A. Colored Tape (260519.T01).

- 1. Colored tape shall be used to identify individual conductors larger than # 6 AWG.
- 2. 3M colored tape or approved equal.

## B. Cable Ties (260519.T05).

- 1. Cable ties shall be nylon, adjustable, self-locking, and properly sized for the bundle and force implied.
- 2. Thomas and Betts, Panduit, or approved equal

#### C. Pulling Compound (260519.P01).

- 1. Pulling compound shall be non-corrosive, noncombustible, nonflammable waxed based lubricant listed for this use.
- 2. Ideal Company, Polywater, Inc., or approved equal.

## **PART 3 EXECUTION**

#### 3.01 INSTALLATION

#### A. General.

- Reference Section 260533 Raceways and Boxes for Electrical Systems for additional information.
- Conductor and cable installations shall meet or exceed the NECA National Electrical Installation Standards.
- 3. CONTRACTOR shall not exceed the manufacturer's recommendations for maximum pulling tensions or minimum bending radii for respective conductors or cables.
- 4. Pulling compound is recommended for all conductor or cable installations and shall be used on all installations requiring a mechanical pulling device.
- 5. CONTRACTOR shall furnish and use a dynamometer on all conductor or cable installations requiring the use of a mechanical pulling device. The dynamometer shall be used to verify the maximum pulling tensions are not exceeded. Should the pulling tensions be exceeded, the conductor or cable shall be removed from the raceway and discarded. It shall not be reused under any circumstance on the project. The CONTRACTOR shall be responsible to make the alterations necessary before attempting to re-pull new conductors or cables.
- 6. Immediately after pulling in conductors or cables, the pulling compound shall be completely removed from the conductors or cables, from boxes, enclosures, floors, walls, etc.
- 7. Conductor and cable installations shall be continuous without splices or intermediate terminations unless specifically identified on the Drawings or prior written approval from the ENGINEER.
- 8. Where conductors or cables are routed in boxes enclosures or cable tray they shall be neatly bundled with cable ties at intervals not to exceed 12 inches on center. The tension for the cable ties shall be set with a tool specifically manufactured for that purpose and of the same manufacturer as the cable tie. Side cutters, linemen pliers and similar tools shall not be used to cut the tail end of the cable tie. The CONTRACTOR shall only use the tool specifically manufactured for this purpose and of the same manufacturer as the cable tie.
- 9. Conductors and cables shall not be installed until the raceway, boxes, enclosures, conduit bushings, etc. have all been installed. Where conductors or cables have been installed prior to meeting this requirement, the ENGINEER shall at their discretion elect to have the conductors or cables removed, disposed of and replaced with new product.
- 10. Should the outer jacket of any conductor or cable be damaged in any way, they shall be removed, disposed of and replaced with new product.
- 11. An equipment grounding conductor shall be installed in all raceways. Size shall be as identified on the Drawings or the NEC, whichever is greater, but in no case shall it be less than # 16 AWG for under 50 volts and no less than # 14 for 50 volts or above.

#### B. MC Cable Installation

- Shall be used for branch circuits within a room or space with accessible ceiling.
- 2. Not acceptable in kitchen or other wet environments.
- 3. There shall be no shared neutrals in any multi-wire branch circuits.
- 4. Not acceptable under windows.

## SECTION 26 05 26 GROUNDING AND BONDING

## **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - The section includes requirements for grounding electrodes, equipment grounding and electrical bonding.

#### 1.02 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260526.G01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, methods of installation and related information for each item specified in PART 2 PRODUCTS.

#### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

#### A. Compression Connectors (260526.C20).

- 1. Compression connections shall be provided as shown on the drawings and as required for bonding end-use equipment.
- 2. Compression connections shall be compress-deforming type, extruded copper material.
- 3. Compression connections shall be tin electroplated for corrosion resistance.
- 4. Compression connections shall be ring-type connectors. Forked connectors shall not be used on grounding conductors.
- 5. Provide Burndy products or approved equal

## B. Mechanical Connectors (260526.C21).

- 1. Mechanical connectors shall be provided as shown on the drawings and as required for bonding to pipes.
- 2. Mechanical connectors shall be UL 467 Listed, copper material.
- 3. Mechanical connectors shall be sized to match the pipe being bonded.
- 4. Mechanical connector clamps shall permit parallel or 90° cable connection.

- 5. Mechanical connectors installed below-grade shall include silicon bronze hardware.
- 6. Provide Burndy GAR3902 series for above-ground installations or approved equal.
- 7. Provide Burndy GAR-BU series for below-grade installation or approved equal.

#### PART 3 EXECUTION

#### 3.01 INSTALLATION

#### A. General.

- 1. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
- 2. Bond separately derived systems, including generators, to the grounding electrode system.
- 3. Maintain equipment ground continuity throughout the facility by means of a grounding conductor routed in all raceways.
- 4. Provide grounding conductors pursuant to Section 260519. Conductors shall be copper and shall be sized per the Drawings or the NEC, whichever is greater.
- 5. Provide ground bushings for all conduits that do not terminate in a hub type fitting and install at the source of power with a bonding conductor fastened to the ground bushing.
- 6. Provide ground bar kits as shown on the Drawings and where two (2) or more grounding conductors are terminated in a box or enclosure.
- 7. Install ground rods at the locations and in the number shown on the Drawings or per the NEC, whichever is greater.
- 8. Bond the grounding electrode system to all metallic water and wastewater piping.

## B. Grounding Conductors.

- 1. Brush grounding conductors clean of debris before connections are made.
- 2. Strip insulated conductor insulation in a neat, workman like manner where insulated conductors are used.
- 3. Fasten all conductors securely.

#### C. Connections.

- 1. Install connectors according to the manufacturer's directions, using the proper dies, tools, molds, shots, loads, etc. designed specifically for this purpose.
- 3. Provide compression connector type connections to end use equipment and bolt to the equipment using washers and split lock washers for secure fastening. Bolts shall be grade 5 for grounding connections and shall be tightened to the manufacturer's recommend torque.

## SECTION 260529 HANGERS AND SUPPORTS

## **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - This section includes requirements pertaining to electrical equipment anchoring and electrical equipment hanging and support.

#### 1.02 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260529.H01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, equipment weight and related information for each item specified in PART 2 PRODUCTS.
- 3. Seismic calculations and drawings.

#### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

#### A. Galvanized Hardware (260529.H11).

- 1. Bolts shall be hot dipped galvanized steel and sized for the load served and have a hex head unless specifically specified otherwise elsewhere.
- 2. Nuts shall be hot dipped galvanized steel hex nut.
- 3. Washers shall be hot dipped galvanized steel, USS pattern flat washers.
- 4. Split lock washers shall be hot dipped galvanized steel.
- 5. Threaded rods and couplings shall be hot dipped galvanized steel.
- 6. Eye-bolts, u-bolts, bent-bolts and similar connecting hardware shall be hot dipped galvanized steel.

## B. Galvanized Anchors (260529.A11).

1. Wedge or stud anchors installed in concrete or masonry shall be hot dipped galvanized steel and sized for the load served.

2. Toggle type fasteners shall only be used in hollow sheetrock wall. The wing part of the fastener may be mild steel, but the bolt shall be hot dipped galvanized steel.

## C. Galvanized Beam Clamps (260529.B11).

1. Beam clamps shall be hot dipped galvanized steel and sized for the load served.

## D. Galvanized Strut Channel (260529.S01).

- Galvanized strut channel shall be hot dipped galvanized after fabrication and shall be a minimum of 12 gauge.
- 2. Galvanized strut channel shall have factory pre-drilled holes.

#### **PART 3 EXECUTION**

#### 3.01 INSTALLATION

#### A. General.

- 1. Hardware shall be set to a torque as recommended by the manufacturer.
- 2. Washers and split lock washers shall be installed on all bolts, threaded rods and anchors.
- 3. Lead or plastic type anchors are prohibited from use on the project.
- 4. When threaded rods are installed in drop-in type anchors, a washer, split lock washer and a jamb nut shall be installed at the anchor to ensure stability.
- 5. When channel (strut) is installed as a hanger or support from threaded rod, washers, split lock washers and jamb nuts shall be installed on both sides of the strut to lock it in place.
- 6. Cut ends of channel, strut, threaded rods or other cut fittings shall be filed smooth before installation.
- 7. Cut ends of hot dipped galvanized channel and strut shall be coated with three coats of cold galvanizing compound after the channel has been filed to prohibit rust.
- 8. Concrete anchors shall be installed as per the manufacturer's directions and set using the manufacturer's supplied tool.
- 9. Threaded rod shall not extend more than one (1) inch beyond the channel, strut or other material it is supporting.
- 10. Hangers and supports shall be installed level and plumb.
- 11. Hangers and supports shall be installed per the National Electrical Code, Building Code and Structural Code and shall be designed to safely support the load. The ENGINEER may request the CONTRACTOR provide a copy of their design calculations for the seismic requirements and the load served.

#### B. Indoor Installation.

1. Regular galvanized products shall be used in all indoor locations.

#### **SECTION 260533**

#### RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

## **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - The Section includes the requirements pertaining to conduits and fittings used to contain electrical conductors and cables.
  - 2. All conductors and cables shall be installed in conduit or approved raceways regardless of which Division the conductors or cables are specified.

#### 1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section.
  - 1. American National Standards Institute (ANSI).
    - a. C80.1, Rigid Steel Conduit-Zinc Coated.
  - 2. American Society for Testing Materials (ASTM).
    - a. A123 E1, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.
  - 3. National Electrical Contractors Association (NECA).
    - a. National Electrical Installation Standards (NEIS).
  - 4. National Electrical Manufacturers Association (NEMA).
    - a. TC 3, PVC Fittings for use with Rigid PVC Conduit and Tubing.
    - b. TC 6, PVC and ABS plastic Utilities Duct for Underground Installation.
  - 5. Nation Fire Protection Association (NFPA).
    - a. 70, National Electrical Code (NEC).
  - 6. Underwriters Laboratories, Inc. (UL).
    - a. 6, Standard for Safety Rigid Metal Conduit.
    - b. 514B, Standards for Safety Fittings for Conduit and Outlet Boxes.
    - c. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.
    - d. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPE Conduit.
    - e. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.
    - f. 360, Standard for Safety Liquid-Tight Flexible Metallic Conduit.
    - g. 797, Standard for Safety Electrical Metallic Conduit.

## 1.03 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260533.S01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any

- product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
- 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- 1. Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, equipment weight and related information for each item specified in PART 2 PRODUCTS.

#### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

PROJECT AREA	NEMA ENCLOSURE TYPE	EXPOSED CONDUIT TYPE	ENVIRONMENT W = WET D = DAMP C = CLEAN/DRY X = CORROSIVE H = HAZARDOUS	SUPPORT MATERIALS
Interior	NEMA 1	EMT	С	GALV

## A. EMT Conduit (260533.C50).

- 1. EMT conduit may be used in all indoor and outdoor locations. In damp and outdoor locations the fittings shall be watertight compression fittings. Set screw fittings shall be acceptable in indoor locations.
- 2. Conduit connectors shall have insulated throats, plastic bushings or ground bushing installed.

## B. Galvanized Sheet Metal Boxes (260533.B15).

- 1. Shall comply with NEMA specifications for sheet metal boxes.
- 2. All boxes shall be deep, no shallow boxes shall be permitted.
- 3. Provide mud rings or industrial covers for the devices installed and a depth to match the sheetrock where applicable.

#### 2.02 ACCESSORIES

## A. Firestopping (260533.F90).

- 1. Shall be as specified in Division 07 Specifications.
- 2. Shall be Listed for the conduit, raceway or box being installed.
- 3. Install per the Manufacturer's instructions.

## B. Pulling Twine (260533.T31).

- 1. Provide 200 pound tensile strength pulling twine in spare conduits and as called out elsewhere on the Drawings.
- 2. Greenlee twine, or approved equal.

#### PART 3 EXECUTION

## 3.01 INSTALLATION

- A. General Requirements.
  - Install conduit runs in accordance with the schematic representation shown on the Drawings.

- 2. Minimum conduit size shall be .75 inch unless specifically called out otherwise on the drawings.
- 3. Conduits shall be supported within 18" of all outlets, boxes, panels, cabinets, and deflections. Maximum distance between supports shall not exceed 5'-0".
- 4. Movements and/or sagging of junction boxes, pull boxes, or other conduit terminating housings located above suspended ceilings is unacceptable.
- 5. Where raceways are indicated, but the routing is not identified, the routing shall be the CONTRACTOR'S choice and in accordance with the rest of the Contract Documents and the National Electrical Code (NEC).
- 6. All conduit connections electrical panelboards and switchboards shall be made using EMT only.
- 7. Raceways shall be electrically and mechanically complete before the conductors are installed.
- Routing of conduits may be adjusted to avoid obstructions. Coordinate with other trades
  prior to installation of raceways. Lack of such coordination shall not be justification for extra
  compensation and removal and reinstallation to resolve conflicts shall be at the
  CONTRACTOR's expense.
- 9. Conduits shall be reamed.
- 10. Exposed conduits and surface raceways shall be installed parallel or perpendicular to the structural members and surfaces and shall be level and or plumb.
- 11. When two or more conduits are routed in the same general direction their routing shall be parallel with symmetrical bends.
- 12. Conduits shall be bent with equipment specifically designed for this purpose and for the specific size and type of conduit.
- 13. Conduits that are creased or crushed shall be replaced.
- 14. Install conduits such that they do not interfere with the proper and safe operation of equipment and do not block or otherwise interfere with the ingress and egress and installation of removable hatches and covers.
- 15. Install expansion joints as needed across expansion joints in the structure and at other locations where necessary to compensate for thermal or mechanical expansion or contraction.
- 16. Conduits shall be routed at least six (6) inches from high temperature piping, ducts and flues.
- 17. Final connections to dry type transformers, motors, instruments and other equipment requiring a flexible connection shall be made with LFMC conduit. Lengths shall not exceed three (3) feet.
- 18. All conduits shall be capped throughout construction to prevent entrance of dirt, trash, water, etc.
- 19. Metallic threads shall all be coated with conduit thread lubricant before assembly. Failure to install the lubricant will result in removal of all conduit and reassembly with the conduit lubricant.
- B. Metal Clad (MC) Installation.
  - 1. MC cable shall be permitted in all concealed areas, above accessible ceilings and in walls.
- C. Electrical Metallic Raceway (EMT) Installation.
  - 1. Electrical Metallic raceways (EMT) shall be used throughout this project as follows:
    - a. All exposed areas and surface installations, unless otherwise permitted by this specification.

- b. EMT shall serve as the "homerun" between the panelboard and the first device for receptacle and lighting branch circuits routed above grade. The use of MC type cable shall be permitted to "spider" out of the first device box to the wiring devices within the respective branch circuit. No individual MC run shall exceed 75 feet.
- c. Above all inaccessible ceilings.

#### D. Boxes.

- 1. Install boxes and enclosures in accordance with the schematic representation as indicated on the Drawings.
- 2. Boxes and enclosures shall be mounted level and plumb.
- 3. Boxes and enclosures shall not be altered, holes drilled, etc. in any way that may compromise the NEMA rating of the enclosure or box.
- 4. Boxes and enclosures shall be bonded the equipment grounding conductor.
- 5. Provide a divider whenever a box contains conductors of different potentials that the code requires separation.
- 6. Surface mounted enclosures and boxes shall be spaced off the surface at least 1/4 inch in damp or wet locations.
- 7. Enclosures shall be provided whenever a junction or pull box larger than 4 inches square is required.
- 8. Sheet metal boxes are permitted only in locations where EMT conduit is approved.
- 9. Enclosures shall be labeled with a nameplate as specified in Section 26 05 53 Identification for Electrical Systems. The nameplate shall match the callout on the Drawings. If no callout exists, the CONTRACTOR is responsible to meet with the ENGINEER and develop a list of pull box, junction box and termination box nomenclature and their as-built Drawings shall reflect these callouts.

## SECTION 260553 ELECTRICAL AND CONTROL IDENTIFICATION

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. Requirements for identification of electrical, safety, measurement, data, fire alarm, security, monitoring, control and related components and equipment.

#### 1.02 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260553.S21) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.
- B. Product Data.
  - Pursuant to Section 013300 Submittal Procedures.
  - 2. The initial submittal shall contain all the products, samples and data base specified. An initial submittal that does not contain all the specified data shall be returned as incomplete.
- C. Samples.
  - 1. Provide a sample of each type and size of nameplate, label, tag and means of attachment specified for approval by the OWNER.
- D. Quality Assurance / Quality Control Submittals.
  - 1. The CONTRACTOR shall be responsible for submitting a data base of all identification nameplates, labels, panel schedules and tags required for the Work. The data base shall be developed in the most current edition of Microsoft Excel for the OWNER's future use.
- E. Closeout Submittals.
  - 1. Pursuant to Section 017800 Closeout Submittals.

#### **PART 2 PRODUCTS**

## 2.01 MATERIALS

- A. Circuit Breaker Panel Schedules (260553.S21).
  - 1. Shall be created in Microsoft Excel software. One copy of each schedule shall be included in the closeout submittals.
  - 2. Shall be printed on 60 70 lb white card stock.
- B. Heat Sealing Lamination Products (260553.L11).

- Provide documents in laminate when specified. Laminate shall be clear, non- yellowing and sized for various sized documents.
- 2. Shall be 5 mil in thickness.

## C. Plastic Nameplates (260553.P05).

- Shall have a white background with black engraved letters. Nameplates for emergency functions shall be red background with white engraved letters. The nameplates shall have self-adhesive rated for the environment which they are installed. The font type shall be consistent on all nameplates.
- 2. Provide products supplied by E.R. Perry Signs & Engraving or approved equal.

## D. Epoxy Gel (260553.E05).

- 1. Shall be a two component, 100 % solids, moisture tolerant, high modulus, high strength, structural epoxy paste adhesive.
- 2. Provide Sika type Sikadur 31, Hi-Mod Gel, or approved equal.

## E. Conductor and Cable Identification Sleeves (260553.T31).

- 1. The identification sleeves shall be properly sized for the cable or conductor.
- 2. Shall be adhesive style.
- 3. Sleeves shall be white with black machine generated characters.
- 4. Provide Brady wire and cable sleeves or approved equal.

## F. Flexible Identification Tape (260553.T56).

- 1. Shall be white, red, yellow, clear or as otherwise specified tape with black characters.
- 2. Standard tape size shall be 0.5 inch high unless specified otherwise and shall have extra strength adhesive rated for indoor and outdoor use.
- 3. Provide products manufactured by Brother or approved equal.

## G. Conductor Color Coding (260553.C89).

1. Conductors shall be colored as specified in the table below. The technical specification requirements for the conductors are specified elsewhere.

Conductor Color Coding

System	Conductor	Color
All Systems	Equipment Grounding	Green
IT / Data	Data Cable Sheath (outer cover)	Blue
24 Volt DC	Positive	Blue
	Negative	White w/Blue Stripe
	Discrete Input Line (hot leg) Side	Blue
	Discrete Input Switch Leg	Blue w/White Stripe
	Discrete Output Line (hot leg) Side	Blue
	Discrete Output Switch Leg	Blue w/Orange Stripe
24 Volt AC	Hot Leg	Red

System	Conductor	Color
	Neutral	White
	Discrete Input Line (hot leg) Side	Red
	Discrete Input Switch Leg	Red w/Blue Stripe
120 Volt AC Control	Hot Leg	Red
	Neutral	White
	Discrete Input Line (hot leg) Side	Red
	Discrete Input Switch Leg	Red w/White Stripe
	Discrete Output Line (hot leg) Side	Red
	Discrete Output Switch Leg	Red w/Orange Stripe
120/240 Volt Single Phase	Hot Leg # 1	Black
	Hot Leg # 2	Red
	Neutral	White
120/208 Volt Three Phase	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral	White
120, 208, 277 Volt	Switch Legs	Pink
480 Volt Three Phase	Phase A	Brown
Wye or Delta Corner Tap	Phase B	Orange
	Phase C	Yellow
	Neutral	Gray
120/240 Delta Three Phase	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
	Neutral	Gray

## **PART 3 EXECUTION**

#### 3.01 INSTALLATION

- A. The OWNER'S assigned numbers shall be used for all labeling.
- B. Circuit Breaker Panel Schedules.
  - 1. CONTRACTOR shall request panel schedules in Microsoft Excel software and printing instructions from ENGINEER. CONTRACTOR shall update the panel schedules to reflect as-built conditions. Print schedules on 60 70 lb white card stock with black ink.
  - 2. Schedules shall be neatly trimmed with 1/8" white space borders.
  - 3. The finished schedules shall be laminated and neatly trimmed with 1/8" of laminate border.
  - 4. A sample layout shall be submitted to OWNER for approval prior to installatio.
- C. Plastic Nameplates.
  - Provide plastic nameplates for panelboards, motor control centers, motor starters, disconnects, variable frequency drives, control panels and similar equipment. The verbiage on the nameplate shall be as identified on the Contract Drawings. The CONTRACTOR shall request the required verbiage from the ENGINEER should it not be available on the Contract Drawings.
  - 2. In addition to the nameplate identifying the equipment, a second nameplate shall be provided that identifies the source of power for the equipment i.e. "Fed From PNL208-1".
  - 3. Typically, the nameplates shall be centered and installed near the top of the equipment.
  - 4. Nameplates shall be white with black characters unless specified otherwise.
  - 5. Nameplates on emergency panels shall be red with white characters.
  - 6. install nameplates on the inside of flush panels, visible when the door is opened.
- D. Conductor and Cable Identification Sleeves.
  - 1. Provide adhesive, machine generated, white labels with black characters for all cables and conductors. Explanation is provided below on how various systems shall be identified. In many cases the information necessary to develop the unique identification labels will be provided on the Contract Drawings. The verbiage required for the identification shall be as identified on the Contract Drawings. The CONTRACTOR shall request the required verbiage from the ENGINEER should it not be available or clear based on the information provided on the Contract Drawings.
  - 2. The labels shall be installed between 6 to 8 inches from the end. Conductors shall be labeled at all splices and points of termination.
  - 3. Power conductors and cables, including the neutral and the ground conductors shall all be identified individually. The identification label will be developed as follows: The first set of characters will be the equipment code identifying the source of power "PNL208" followed by the circuit number "CKT 12". For example, the label would read "PNL208-CKT 12".
- E. Device and Faceplate Identification Labels.
  - 1. Devices, faceplates, small electrical boxes 4 inches or less located indoors and similar equipment shall be identified utilizing flexible identification tape. Typically the CONTRACTOR shall provide machine generated, white labels with black characters except as specified otherwise. Explanation is provided below on how various systems shall be identified. In many cases the information necessary to develop the unique identification labels will be provide on the Contract Drawings. The verbiage required for the identification shall be as identified on the Contract Drawings. The CONTRACTOR shall request the required verbiage from the ENGINEER should it not be available or clear based on the information provided on the Contract Drawings.

- 2. Power receptacles faceplates (cover plates) shall state the panel and circuit number. A typical label might read "PNL208-1-CKT 15".
- 3. Light switches faceplate shall state the panel and circuit number(s). A typical label might read "PNL208-2-CKT 15&17".
- 4. Interior emergency light fixtures shall have a unique 0.5 inch adhesive dot applied to facilitate tracking routine maintenance required for emergency lighting. The dots shall be red when they have an integral battery back-up.

#### F. Colored Tape.

- 1. Colored tape shall be installed on conduits used for the systems listed below. The tape shall have extra strength adhesive rated for indoor and outdoor use and two (2) inches wide. CONTRACTOR shall install a single wrap around the circumference of the conduit at five (5) foot intervals. In addition the exterior of junction or pull boxes installed along these raceways shall be painted entirely with 2 coats of paint that matches the tape color.
  - a. Fire alarm / life safety RED.
  - b. Data / IT BLUE.
  - c. Fiber Optic ORANGE.

#### G. Arc Flash Labels.

- 1. The CONTRACTOR shall install arc flash labels on all electrical equipment as required by the NEC and National Fire Protection Association (NFPA) 70E Standard for Electrical Safety. The minimum requirements for the labels are itemized in PART 2 Products.
- 2. The CONTRACTOR shall be responsible for providing the coordination study and arc flash analysis necessary to calculate the incident energy and personal protective equipment (PPE) data required on each label.
- 3. An as-built coordination study and arc flash analysis shall be prepared at the Contractor's expense and be performed by a Professional Engineering licensed in the State of Oregon. The calculations shall utilize SKM Power Tools software and an electronic and hard copy shall be submitted to the Owner for approval. Arc Flash Labels with all data specified by the current edition of the NFPA 70E (Standard for Electrical Safety) and Occupational Safety & Health Administration (OSHA) shall be provided by the Contractor.
- 4. The CONTRACTOR is responsible to make the adjustments to the protective devices and circuit breakers as specified in the coordination study.

## SECTION 260583 WIRING CONNECTIONS

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - This Section includes requirements for conductor termination methods.

#### 1.02 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260583.c01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- 1. Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, applications and related information for each item specified in PART 2 PRODUCTS.

#### **PART 2 PRODUCTS**

## 2.01 MATERIALS

## A. Small Compression Connectors (260583.C01).

- 1. Insulated fork, ring or splicing (butt) connectors shall be provided for # 10 AWG or smaller conductors that splice together or terminate with a screw other than in a terminal block.
- 2. Connectors shall be properly sized for the conductor and for the stud used.
- 3. Burndy, Panduit, Thomas and Betts, or approved equal.

## B. Electrical Spring Connectors (Wire Nuts) (260583.W01).

- 1. Provide properly sized spring connectors for the size and number of conductors spliced.
- 2. Ideal, 3M, Thomas and Betts, or approved equal.

## C. Insulated Mechanical Multi-Tap Connectors (260583.M01).

- 1. Provide properly sized, insulated, mechanical, multi-tapped connectors for splices.
- 2. Burndy, Panduit, Thomas and Betts, or approved equal.

#### 1.02 ACCESSORIES

#### A. Electrical Tape (260583.T40).

1. General electrical tape shall be premium grade, all weather vinyl electrical insulating tape.

2. 3M – Scotch 33+ or approved equal.

## B. Thin Wall Heat Shrink Tubing (260583.T01).

- 1. Thin-walled heat shrink tubing shall be flame retardant and made of cross-linked polyolefin.
- 2. The tubing shall have a minimum operating temperature of 55 to + 135 degrees Celsius.
- 3. Burndy, Panduit, or approved equal.

#### PART 3 EXECUTION

#### 3.01 INSTALLATION

#### A. General.

- 1. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
- 2. Care shall be taken when terminating conductors to avoid kinking, cutting or puncturing the jacket or allowing contamination by grease, oil or water.
- 3. Care shall be taken when terminating conductors to properly support the conductors and to avoid undue pressure on the connector or utilization equipment.
- 4. Conductors shall be terminated by use of lugs, pressure type connectors wire nuts or terminal blocks. Wrapping conductors around a screw type terminal is not acceptable.
- 5. Compression connectors shall be installed using the tool and die provided by the same manufacturer as the connectors and as per their directions.
- 6. Compressions on connectors used for # 8 AWG conductors and larger shall have a minimum of two (2) circumferential crimps.
- Indenter type crimps on compression connectors shall not be used on conductors larger than # 10 AWG.
- 8. Connectors shall be installed as per the manufacturer's directions.
- 9. Insulated wire ferrules shall be provided for conductors terminated on terminal blocks utilizing a crimping tool provided by the ferrule manufacture specifically for this purpose.
- 10. Where wire ducts in enclosures exist, conductors shall be grouped together and routed in the wire ducts and shall be fanned out to the terminals.
- 11. Wire nuts shall be used on conductors # 10 AWG or less and only for splicing conductors at light fixtures, at receptacles and motors. No other splicing of conductors with wire nuts are permitted unless specifically identified on the Drawings.
- 12. All spare conductors shall be identified individually, neatly coiled and fastened with cable ties. The coil shall be labeled to describe its origin. Spare conductors shall be left long enough to be neatly routed and terminate anywhere within the enclosure.
- 13. Conductors installed outdoors which are not terminated the same day, shall have heavy wall heat shrinkable end caps installed the same day they are pulled in. The end caps shall remain in place until the day they are terminated.
- 14. Heavy wall heat shrink tubing shall be installed over splices or over the barrel of connectors installed outdoors.
- 15. Thin wall heat shrink tubing shall be installed over splices or over the barrel of connectors installed indoors.
- 16. As connections are set with a torque wrench, a black felt marker shall be used to mark across the bolt, nut or screw indicating the torque has been set.

## SECTION 260923 LIGHTING CONTROL DEVICES

## **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - This Section includes the requirements for interior and exterior lighting control panels and systems.

#### 1.02 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 260923.E01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- 1. Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, fixture dimensions, options provided and related information for each item specified in PART 2 PRODUCTS.

#### 1.03 SYSTEM DESCRIPTION

- A. Standalone lighting control shall consist of lighting control devices that are not connected to the Digital Daylighting & Dimming Lighting Control System. These spaces shall provide Code required automatic occupancy, vacancy, and daylighting control as shown on the Drawings.
- B. Basis of design shall be Acuity nLight wired system.

## **PART 2 PRODUCTS**

## 2.01 STANDALONE LIGHTING CONTROL

## A. Power Pack (260923.P01).

- 1. Shall be powered by 120-volt singe phase as shown on the Drawings.
- 2. Shall have two RJ-45 ports to connect to control devices via CAT-5E cable.
- 3. Supplies 40mA of bus power for control devices.
- 4. Shall be plenum rated.
- 5. Self-contained relay switches line voltage load.
- 6. Acuity nLight nPP16 series.
- B. Ceiling Mounted Motion Sensor and Power Pack (260923.S02).

- Shall have 360-degree coverage, automatic on/off operation, light-level sensing, and adjustable time-out.
- 2. Shall be dual technology, PIR/Micro-phonics, with small motion sensor coverage.
- 3. Shall include auxiliary contact for HVAC control wiring.
- 4. Shall be connected with CAT-5E cable to power pack.
- 5. Shall have 1,000 square foot coverage.
- 6. Acuity nLight nCM PDT RJB series.

## C. Low Voltage Wall Switch Stations (260923.W01).

- 1. Shall be provided with 0-10 volt raise/lower buttons, where shown on the Drawings.
- 2. Shall be provided with number of buttons as shown on the Drawings.
- 3. Shall be connected with CAT-5E cable to power pack.
- 4. Acuity nLight nPODMA series.

#### **PART 3 EXECUTION**

### 3.01 INSTALLATION

#### A. General.

- 1. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
- Devices shall be bonded to their enclosure and the equipment grounding conductor with a separate grounding conductor attached to the device which will allow the device to be detached from the enclosure without disconnecting the equipment grounding conductor from the enclosure.
- 3. The use of the mounting yoke as the only method for bonding is unacceptable.
- 4. Devices that are not installed at the end of the line (circuit) shall be pig-tailed out and the pig-tails shall be connected to the line and load conductors.
- 5. After the pigtailed conductors are terminated on the device and before it is installed in the enclosure the exposed energized parts shall be wrapped with electrical insulating tape with a minimum of three wraps.
- 6. As the device is installed in the enclosure, care shall be taken to neatly fold the conductors inside the enclosure so as to not kink, bind or otherwise damage the sheath of the conductors.
- 7. Terminations on all devices shall be via pressure or compression type connectors. Wrapping conductors around a termination screw and tightening is unacceptable.
- 8. Mounting height for switches shall be 42 inches to center above finished grade unless called out otherwise on the Drawings or specified at different height to meet minimum code requirements. Where countertops are present, switches shall be mounted 5 inches to center above the back-splash. The CONTRACTOR is responsible to coordinate with the approved casework submittals. Failure to do so will require the CONTRACTOR to relocate devices at their expense.
- Coordination is the responsibility of the CONTRACTOR. If a conflict exists for the mounting location of devices, the CONTRACTOR shall bring it to the ENGINEER's attention during the rough-in phase and the ENGINEER shall provide direction. Failure to coordinate conflicts during the rough-in phase will result in relocation of devices at the CONTRACTOR's expense.
- 10. Coordinate the installation of ceiling mounted devices and equipment with the Mechanical Contractor. Install occupancy sensors at least 3 feet from diffusers.
- 11. All sensors shall be set for occupancy mode.

12. The position of devices, as shown on the Drawings, are general locations only unless dimensioned. The CONTRACTOR is responsible to coordinate with various trades to ensure no conflict exists.

## 3.02 CONDUIT FOR LIGHTING CONTROL WIRING

- A. EMT type conduit shall be provided for all exposed wiring applications. No lighting control wiring shall be exposed.
- B. EMT type conduit shall be provided for all recessed lighting control devices in walls
  - 1. Within existing walls, the use of LFMC shall be permitted to "fish" to a new backbox.
- C. Wiring above accessible ceilings shall be permitted to be installed using j-hooks, hanger ties, clips, and other methods as permitted by Code.

## 3.03 START-UP, COMMISSIONING, AND CALIBRATION

- A. Test all lighting control systems prior to commissioning to ensure proper operation.
- B. Correct all deficiencies prior to commissioning.
- C. Calibrate all sensors.

# SECTION 262726 WIRING DEVICES

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. This Section includes the requirements for wiring devices such as receptacles, toggle switches and devices plates.

#### 1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section.
  - 1. National Electrical Contractors Association (NECA): National Electrical Installation Standards (NEIS).
  - 2. National Electrical Manufacturers Association (NEMA).
    - a. WD1 General Requirements for Wiring Devices.
    - b. WD6 Wiring Device Dimensional Requirements.
  - 3. National Fire Protection Association (NFPA): 70.
  - 4. Underwriters Laboratories, Inc. (UL): 1070.

#### 1.03 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 262726.R01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.
- B. Product Data.
  - 1. Pursuant to Section 013300 Submittal Procedures.
  - 2. Manufacturer's data including materials of construction, equipment weight, and related information for each item specified in PART 2 PRODUCTS.

#### **PART 2 PRODUCTS**

## 2.01 MATERIALS

#### A. Tamper Resistant Receptacles (262726.R15).

- 1. Shall be tamper-resistant, two-pole, three wire grounding type with screw type terminals suitable for number 10 American Wire Gauge (AWG).
- 2. Shall be NEMA 5-20R, rated for 20 amperes, 125-volt configuration.
- 3. Provide duplex or single receptacles as shown on the Drawings.

- 4. Shall be gray in color unless fed from an emergency circuit and in that case the receptacle shall be red in color.
- 5. Provide Hubbell BR20 tamper resistant receptacles, Pass & Seymour, or Leviton.

## B. Ground Fault Circuit Interrupter Receptacles (262726.R10).

- 1. Shall be heavy duty hospital grade, tamper-resistant, weather-resistant two-pole, three wire grounding type with screw type terminals suitable for number 10 American Wire Gauge (AWG).
- 2. Shall be NEMA 5-20R, rated for 20 amperes, 125-volt configuration.
- 3. Provide duplex or single receptacles as shown on the Drawings.
- 4. Shall be gray in color unless fed from an emergency circuit and in that case the receptacle shall be red in color.
- 5. Provide Hubbell GFR8300S, Pass & Seymour, or Leviton. Red receptacles shall be sample model number except for color designation.

## C. Device Plates (262726.P01).

- 1. Install type 302 stainless steel device plates at all indoor locations unless called out otherwise on the drawings.
- 2. Provide Hubbell or approved equal.

## D. Fire Rated Poke-Thru (262726.P11).

- 1. Shall be fire rated and shall maintain the fire rating of the existing slab.
- 2. Shall be capable of supporting power and data devices.
- 3. Shall be provided with one duplex receptacle for power.
- 4. Shall be provided with two (2) CAT 6 jacks.
- 5. Shall accept up to 1-1/4" trade size conduits..
- 6. Cover shall be brushed aluminum.
- 7. Provide dividers to separate power and communication wiring.
- 8. Cover plate shall be the responsibility of the CONTRACTOR and shall be determined using the Architect's approved flooring material.
- 9. Provide Hubbell 2x2 Flush FRPT One-Piece Unit, or approved equal.

#### **PART 3 EXECUTION**

#### 3.01 INSTALLATION

#### A. General.

- 1. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
- 2. Devices shall be bonded to their enclosure and the equipment grounding conductor with a separate grounding conductor attached to the device which will allow the device to be detached from the enclosure without disconnecting the equipment grounding conductor from the enclosure.
- 3. The use of the mounting yoke as the only method for bonding is unacceptable.
- 4. Devices that are not installed at the end of the line (circuit) shall be pig-tailed out and the pig-tails shall be connected to the line and load conductors.
- 5. After the pigtailed conductors are terminated on the device and before it is installed in the enclosure the exposed energized parts shall be wrapped with electrical insulating tape with a minimum of three wraps.
- 6. As the device is installed in the enclosure, care shall be taken to neatly fold the conductors inside the enclosure so as to not kink, bind or otherwise damage the sheath of the conductors.

- 7. Terminations on all devices shall be via pressure or compression type connectors. Wrapping conductors around a termination screw and tightening is unacceptable.
- 8. Mounting heights for receptacles shall be 18 inches to center from finished floor unless called out otherwise on the Drawings or specified at different height to meet minimum code requirements. Where countertops are present, receptacles shall be mounted horizontally and mounted 4 inches to center above the back-splash. The CONTRACTOR is responsible to coordinate with the approved casework submittals. Failure to do so will require the CONTRACTOR to relocate devices at their expense.
- 9. Mounting height for switches shall be 42 inches to center above finished grade unless called out otherwise on the Drawings or specified at different height to meet minimum code requirements. Where countertops are present, switches shall be mounted 5 inches to center above the back-splash. The CONTRACTOR is responsible to coordinate with the approved casework submittals. Failure to do so will require the CONTRACTOR to relocate devices at their expense.
- 10. Coordination is the responsibility of the CONTRACTOR. If a conflict exists for the mounting location of devices, the CONTRACTOR shall bring it to the ENGINEER's attention during the rough-in phase and the ENGINEER shall provide direction. Failure to coordinate conflicts during the rough-in phase will result in relocation of devices at the CONTRACTOR's expense.
- 11. All receptacles fed from emergency panels shall be red in color.
- 12. Devices shall be installed level and plumb. Devices shall be brought out plumb with the wall surface via UL listed spacers approved for this purpose if necessary.
- 13. Devices shall be tested for voltage, polarity, ground integrity and in the case of GFCI receptacles, that they operate as intended.
- 14. The position of devices, as shown on the Drawings, are general locations only unless dimensioned. The CONTRACTOR is responsible to coordinate with various trades to ensure no conflict exists.

## SECTION 265100 INTERIOR LIGHTING

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. This Section includes the requirements for the interior illumination fixtures and controls.

#### 1.02 SUBMITTALS

- A. A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 265100.I01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

## B. Product Data.

- Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, fixture dimensions, options provided and related information for each item specified in PART 2 PRODUCTS.

## 1.03 QUALITY ASSURANCE

- A. Regulatory Requirements.
  - 1. All products shall be UL listed for the environment they are installed in.

## **PART 2 PRODUCTS**

#### 2.01 FIXTURES

A. Reference the Luminaire Schedule for all Interior Luminaires.

## PART 3 EXECUTION

## 3.01 INSTALLATION

- A. General.
  - 1. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
  - 2. CONTRACTOR shall provide all mounting hardware required to mount luminaires in lay-in or gypsum board ceilings. Verify ceiling types with the ARCHITECT. Luminaires of a given type may be used in more than one type of ceiling.
  - 3. Luminaires shall be supported by #12 AWG hanger wire connected to the luminaire and the building structure.

- a. Provide new hanger wire for all luminaires which are re-used and re-installed per the Oregon Structural Specialty Code.
- 4. Positively attach all luminaires to the suspended ceiling system. Attachment devices shall have capacity of 100% of the luminaire weight acting in any direction.
- 5. Verify luminaire locations with the ARCHITECT'S reflected ceiling plan.
- 6. Adjustable luminaire heads shall be aimed as directed by the ENGINEER.
- 7. All luminaires shall be cleaned of all dirt, dust, and fingerprints prior to close-out.

#### **SECTION 270000**

#### **GENERAL COMMUNICATION SYSTEM REQUIREMENTS**

#### **PART 1 GENERAL**

#### 1.01 SECTION INCLUDES

General communications system requirements.

#### 1.02 REFERENCES

- A. The following is a list of Standards that may be referenced in the Section.
  - American National Standards Institute (ANSI).
  - 2. ANSI-J-STD 607, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
  - 3. Building Industries Consulting Services International (BICSI).
  - 4. Electronics Industries Alliance (EIA).
  - 5. International Building Code (IBC).
  - 6. Institute of Electrical and Electronics Engineers (IEEE).
    - a. Std. 110, Recommended Practice for Powering Grounding Sensitive Equipment.
  - 7. National Fire Protection Association (NFPA).
    - a. 70, National Electrical Code.
    - b. 75, Protection of Electronic Computer and Data Processing Equipment.
  - 8. Telecommunication Industry Association (TIA) / Electronics Industry Alliance (EIA).
    - a. TIA/EIA 455-A, Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connection and Terminating Devices, and Other Fiber Optic Components
    - b. ANSI/TIA/EIA 568-B, Commercial Building Telecommunications Cabling Standard
    - c. ANSI/TIA/EIA 569-B, Commercial Building Standard for Telecommunications Pathways and Spaces
    - d. ANSI/TIA/EIA 606, Administration Standard for Commercial Telecommunications Infrastructure
    - e. TIA/EIA 758, Customer-Outside Plant Telecommunications Cabling Standard

#### 1.03 CONTRACTOR'S RESPONSIBILITY FOR FIELD VERIFICATION OF EXISTING CONDITIONS

- A. The CONTRACTOR shall be responsible for performing field verification of the existing conditions prior to bidding. The nature of this work inherently requires field observation to understand the existing conditions and scope of work.
- B. Failure to observe the existing conditions or ignorance of existing conditions shall the responsibility of the CONTRACTOR alone. Additional services shall not be authorized due to the CONTRACTOR'S lack of understanding of the existing conditions.

## 1.04 CONTRACTOR'S RESPONSIBILITY FOR SHUTDOWNS AND MAINTAINING EXISTING SYSTEMS

- A. Shutdowns of any Division 26, 27, 28 system shall be coordinated with the OWNER prior to performing the shutdown. The CONTRACTOR shall provide the OWNER with a written schedule identifying the system, duration, and impact on the OWNER's facility.
- B. Existing Division 26, 27, and 28 systems not impacted by the work in this project shall be protected and maintained during construction. Any system not identified on the Drawings or within these Specifications shall be brought immediately to the attention of the ENGINEER and OWNER.
  - 1. The CONTRACTOR shall be responsible for bearing the cost of repairing or restoring all electrical systems that are disrupted or damaged during construction. The systems shall be repaired and restored to their original condition.

#### 1.05 COMMUNICATION SYSTEM WORK SHOWN ON DIVISION 26 OR DIVISION 28 PLANS

A. The electrical plans may show work associated with the Division 27 systems on Division 26 or 28 drawings within the plan set. The CONTRACTOR shall be responsible for looking at ALL drawings during the bid period.

## 1.06 PERMITS, FEES AND SERVICE CHARGES

- The CONTRACTOR shall obtain all electrical permits required to complete the work and pay all associated fees.
- B. The CONTRACTOR shall coordinate and provide for the installation and operation of franchise utility service (including any telephone and/or leased lines specified) as required during construction, startup, testing, and operation of the work until substantial completion.

#### 1.07 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. Riser and other diagrams are schematic and are intended to show the approximate location of equipment, and the general alignment of conduits and piping, and shall not be used for obtaining quantities. Dimensions given on the plans shall take precedence over scaled dimensions and all dimensions whether in figures or scaled, shall be verified in the field.
- B. Not all components for the Division 27 systems are shown on the DRAWINGS. The CONTRACTOR shall be responsible for providing a complete system, regardless of whether or not components are shown on the DRAWINGS.
- C. The electrical drawings do not show complete details of the site conditions. The CONTRACTOR shall check actual conditions.
- D. The exact location of apparatus, fixtures, equipment, conduit and piping shall be ascertained by the CONTRACTOR in the field, and the work shall be laid out accordingly. Should the CONTRACTOR fail to ascertain such locations or coordinate with work performed by other trades, the work shall be changed at no additional cost to the OWNER when so ordered by the ENGINEER. The ENGINEER reserves the right to make minor changes in the location of conduit, piping and equipment up to the time of installation without additional cost to OWNER.
- E. CONTRACTOR shall provide all labor, materials, equipment, machinery, and tools necessary to provide all electrical equipment specified and shown on the Drawings. All items not specified in detail or shown on the Drawings but necessary for complete installation shall be provided by the CONTRACTOR.

## 1.08 SUBMITTALS

- A. Contractor shall submit all the product data in Division 27 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 270000.A01) typewritten in the upper right-hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.
- B. Deferred Submittals.

- 1. Submittals for seismic bracing/anchoring and wind loads shall be a deferred submittals. Engineering of the seismic bracing and anchoring system shall be provided by a licensed Engineer in the State of Oregon. Submittals shall include calculations and drawings, including connection types/materials/sizes, load, maximum load, dimensions, etc
- C. The CONTRACTOR shall indicate on the submittals all variances from the Specifications.
- D. Record Drawings. After the completion of construction, the CONTRACTOR shall provide one set of "as-built" drawings to the ENGINEER as specified herein showing the location of buried conduits and all changes or deviations from the original drawings.
- E. After the completion of construction, a printout and electronic copy of any programming and/or set-points for controllers, PLCs, meters or other programmable equipment, including VFDs.
- F. Final inspection certificates shall be submitted prior to final payment.

#### 1.09 SUBSTITUTION REQUESTS

- A. All substitution requests shall meet the following:
  - 1. Shall be received by the ENGINEER no later than ten (10) business days prior to date of final addendum during the bid period. Submittals that do not meet this requirement shall be returned as LATE and shall not be considered for a substitution request.
  - 2. Shall have clearly labeled and marked-up product data, indicating the features and part numbers. Submittals shall be individually labeled with the reference key note number or luminaire identification tag for which the substitution request is being made. Generic product catalog data or unmarked and or unlabeled substitution requests shall not be considered and shall be returned as INCOMPLETE to the CONTRACTOR.
  - 3. All product data identified as OWNER Standard shall not be eligible for a substitution request.

#### 1.10 COORDINATION OF WORK

- A. The CONTRACTOR shall plan his work in coordination with the other trades and with the power and telephone utility authorities.
- B. The CONTRACTOR shall field verify all dimensions of equipment to be installed or provided by others so that correct clearances and connections may be made between the work installed by the CONTRACTOR and equipment installed or provided by others.
- C. The CONTRACTOR shall arrange all conduit runs so that they do not interfere with piping, structural members, etc.
- D. All working measurements shall be taken from the sites, checked with those shown on the drawings, and if they conflict, reported to the ENGINEER at once, and before proceeding with the work. Should the CONTRACTOR fail to comply with this procedure, he shall alter his work at his own expense as directed by the ENGINEER.
- E. No additional payments will be allowed where obstructions in the work of other trades, or work under this contract requires offsets to conduit runs.
- F. The CONTRACTOR is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.
- G. The CONTRACTOR shall provide all temporary power necessary for existing site equipment and for all construction needs.

#### 1.11 SUPERVISION

A. The CONTRACTOR shall maintain adequate supervision of the work and shall have a responsible person in charge at the site during all times that work under this contract is in progress, or when necessary for coordination with other work.

#### **1.12 CODES**

A. Work shall conform to the National Electrical Code (NEC), and State Codes and other applicable codes, even though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality for materials and workmanship.

## 1.13 CONTRACTOR'S RECORD DRAWINGS & AS-BUILTS

- A. The CONTRACTOR shall maintain a neatly marked set of record drawings showing the locations of all buried conduits and other utilities encountered or installed during construction. The final locations of panels, field mounted instruments and panels, terminal boxes, junction boxes, receptacles, light switches and other materials included in the work shall be shown, as well as conduit routing between them to the extent it differs from the design drawings. Record drawings shall be kept current with the work as it progresses and shall be subject to inspection by the OWNER's Representative at any time. Failure to keep field record drawings current may result in the issuance of a stop work order or delay in the processing of pay requests until the record drawings are made current.
- B. The CONTRACTOR shall provide one complete set of as-built electrical schematics for all panels and equipment provided, including PLC I/O schematics as applicable, panel elementary diagrams, interconnecting wiring diagrams, wire numbers, termination strip locations and numbers. These shall be in the same format and style as those in the Contract Documents and submittal requirements.
- C. All information shown on the CONTRACTOR's field record drawings and as-built schematics shall be subject to verification by the OWNER's Representative. If significant errors or deviations are noted by the OWNER's Representative, new as-builts shall be completed at the CONTRACTOR's expense.

#### **PART 2 PRODUCTS**

#### 2.01 PORTABLE OR DETACHABLE PARTS

- A. The CONTRACTOR shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adapters, blocking chips and inserts until completion of his work.
- B. These parts shall be delivered to the ENGINEER and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the CONTRACTOR's request for final payment.
- C. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendations.

## 2.02 NEW PRODUCTS

- A. All products shall be new without defects and covered by Manufacturer's warranty. Products shall be re-used only where indicated on the Drawings.
- B. All products shall be listed, labeled, and certified by a testing agency approved by the state of Oregon.
- C. All equipment of the same type and capacity shall be by the same manufacturer.

#### **PART 3 INSTALLATION**

#### 3.01 IDENTIFICATION

A. All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

#### 3.02 WORKMANSHIP & COORDINATION

- A. All work shall be performed by personnel skilled in the particular trade in a workmanlike manner. Workmanship shall conform to the standards of the NEC and the National Electrical Installation Standards (NEIS).
- B. The ENGINEER shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgment any material or equipment has not been properly installed or finished, the

- CONTRACTOR shall replace the material or equipment whenever required and reinstall it in a manner entirely satisfactory to the ENGINEER without any increase in cost to the OWNER.
- C. The CONTRACTOR shall coordinate and verify the installation of all equipment furnished by him to other trades, or equipment provided and installed by other trades that is connected to the electrical or control systems. Work shall include the furnishing of all labor, materials, and equipment required for the installation of a complete and operable system as hereinafter specified and as indicated on the drawings. The Contract Documents are complementary and what is called for by anyone shall be as binding as if called for by all. Unless otherwise specifically stipulated, the term "furnished and installed complete" shall be considered a part of this section.

## 3.03 TEMPORARY HEATING, LIGHTING AND POWER

- A. The CONTRACTOR shall provide all heat, lighting and power required to construct and protect the work until the work is placed in service by the OWNER for beneficial use of the OWNER. Temporary heaters shall be provided as required to keep the work area and all new electrical components dry).
- B. The source for temporary power shall be from the electric utility or OWNER approved CONTRACTOR supplied auxiliary power units. The installation for electric power shall meet the requirements of local authorities and of OSHA.
- C. The CONTRACTOR shall obtain all permits and pay all costs for connecting temporary power service at no expense to the OWNER.

#### 3.04 SUPPORT BACKING

A. Provide any necessary backing required to properly support all fixtures and equipment installed under this contract.

#### 3.05 CUTTING, PATCHING AND FRAMING

- A. The CONTRACTOR shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.
- B. Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-metallic non-shrink grout.
- C. Cutting, fitting repairing and finishing of carpentry work, metal work, or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around the holes.
- D. Penetrations through fire and smoke rated partitions shall be sealed in accordance with Section 078400 Firestopping.

#### 3.06 PROTECTION OF CABLES

- A. All Division 27 cables shall be protected from both paint and damage during construction. All cables which have been damaged shall be replaced.
- B. Protect cables from paint and dust. Replace cables damaged by paint.

## 3.07 ACCESS PANELS

A. The CONTRACTOR shall provide all access panels in hard ceilings to allow NEC-required access to junction boxes, pull boxes, and light fixtures. The CONTRACTOR shall submit to the ENGINEER for approval floor plans (1/8" = 1'-0" scale minimum) which clearly indicate proposed access panel locations.

## 3.08 CLEANING AND TOUCH-UP PAINT

- A. Upon completion of work, all electrical equipment shall be cleaned.
  - 1. Vacuum all dirt, metal shavings, and foreign materials from all enclosures. The use of compressed air shall not be acceptable.

- 2. All stains, dirt, and fingerprints shall be removed from enclosures, and all other electrical and communications equipment covers.
- B. Provide touch-up paint on equipment that has been scraped, scratched, or chipped during construction. Paint color shall match color of equipment.

# SECTION 271500 COMMUNICATION HORIZONTAL CABLING

#### **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - 1. The section includes requirements for communication horizontal cabling.

#### 1.02 REFERENCES

- A. The following is a list of Standards which may be referenced in this Section.
  - 1. Telecommunications Industry Association (TIA).
    - a. TIA / EIA 568B.
    - b. TSB-36.
    - c. TSB-40A.
  - 2. Institute of Electrical and Electronics Engineers.
    - a. IEEE 802.3 100Base-T.

#### 1.03 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 271500.G01) typewritten in the upper right-hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete
- B. Product Data.
  - 1. Pursuant to Section 013300 Submittal Procedures.
  - 2. Manufacturer's data including materials of construction, weight, and related information for each item specified in PART 2 PRODUCTS

## **PART 2 PRODUCTS**

## 2.01 CABLING REQUIREMENTS

**A.** The following table summarizes the Division 27 and 28 horizontal cabling requirements for this project, unless shown differently on the Drawings.

Horizontal Cabling Requirements		
System / Device	Cabling	Notes
Data Outlets	CAT 6	Quantities as shown on the drawings.

- B. CAT6 Horizontal Cabling Plenum (271500.C96).
  - 1. Shall be unshielded twisted (UTP) copper conductors, Category 6, four-pair.

- 2. Plenum rated.
- Indoor rated.
- 4. Shall be certified by the Manufacturer to transport 1,000 Mb/s.
- 5. Conductors shall be 23 AWG solid bare copper.
- Color shall be blue.
- 7. Berktek LANmark CAT6 Series, or approved equal.

## C. RJ45 Jacks (271500.J45).

- 1. Jacks shall be CAT6 compliant, suitable for 1000BASE-T applications.
- 2. Color shall be blue.
- 3. Keystone design.
- 4. Jacks shall be Leviton, or approved equal.

## D. Low Voltage Device Plates (271500.W01).

- 1. Shall be single gang, 6-port.
- 2. Shall be provided with blank covers for all unused ports.
- 3. Shall be white nylon.
- 4. Shall be Leviton, Legrand, or equal.

#### PART 3 EXECUTION

#### 3.01 INSTALLATION

#### A. General.

- Cables shall be installed between patch panels and outlet jacks utilizing cable trays shown
  on the Drawings. Cables shall be routed in cable trays to the room containing the outlet
  jack. Utilize J-hooks or conduit as described within Specification Section 270529 Hangers
  and Supports for Communications Systems and 270533 Conduits and Boxes for
  Communications Systems to route cable to the outlet jack.
- 2. Cable shall not be secured to ceiling hanger wire.
- 3. Cable shall not be secured to ceiling hanger wire:
  - a. Power conduits 18 inches.
  - b. Luminaires 18 inches.
  - c. Mechanical equipment 18 inches.
  - d. Transformers 18 inches.
  - e. Other sources of AC Power 18 inches.
- 4. Neatly group cables together that terminate on the same patch panel in MDF and IDF rooms. Utilize velcro cable ties.
- 5. Cable runs shall not obstruct walkways or service access to mechanical and electrical equipment. All cabling shall be self-supported and attached to the structure as required by Code. Cables shall follow a common path where possible. Sweep 90-degree bend radii shall be installed.
- 6. Cables shall be installed parallel and perpendicular to the structural elements of the building. Line of sight "spider webs" shall not be permitted.
- 7. Cables installed above accessible ceilings shall not block access to access panels, mechanical equipment, piping valves, electrical equipment, or other equipment requiring access for maintenance and service.
- 8. Cables shall not be supported by any temporary building structure, including conduit, duct work, water pipes, hydronic piping, storm water piping, T-bar ceiling tiles, and/or support wires.

- 9. Cables above accessible ceilings shall be supported every 4-6 feet.
- 10. Cables shall be bundled in groups no larger than 48. Cable bundles shall be of a similar system only (i.e. IT, Security). Bundling cables of different systems shall not be acceptable. Individual cable runs shall neatly branch off the main run.
  - a. Exception: If no more than six cables of different systems serve the same area, they shall be permitted to be combined in bundles using j-hooks.
- 11. Cables in cable tray shall be combed to avoid crossing.
- 12. Cables bundles terminating on patch panels shall not cross the centerline of the patch panel. Split the cable bundle and install cables from each side of the patch panel.
- 13. All cables in exposed areas shall be installed in a surface raceway.
- 14. All cables within walls or soffits shall be installed in metallic conduit.
- 15. Provide 36" of coiled slack cable in the ceiling space above all outlet jacks.
- 16. Through-wall penetrations and through-floor penetrations smaller than 7/8" shall not require a metallic conduit sleeve. All penetrations shall be neatly made and sealed after cable installation. Penetrations through fire-rated partitions shall be sealed to maintain the required fire rating.

#### B. Identification

- All horizontal cabling shall be provided with a heat-shrinkable type-written label at BOTH ends.
- 2. All horizontal cabling shall be identified at each junction and pull box and within 10 feet of through-wall fittings, conduits, and within 10-feet of any access points in ceilings, voids, or plenums.
- 3. All identification labeling shall comply with Section 260553 Electrical and Control Identification.

## C. Patch Cable Installation

- 1. Do not move, disconnect, or relocate any existing patch cables without OWNER approval.
- 2. Prior to the installation of all patch cables, verify the termination ports with the OWNER.

#### D. Testina

- 1. Patch cable length shall be the shortest possible between termination points. Patch cable installation shall utilize wire management on cabinets and racks.
- 2. Excessively long patch cable installation shall not be coiled up. The CONTRACTOR shall be responsible for providing the correct length of patch cable.
- 3. The permanent link shall be tested.
- 4. All test results shall be used by the CONTRACTOR to determine any polarity and noise anomalies and CONTRACTOR shall take immediate corrective action for all anomalies.
- 5. Test results shall be used by the CONTRACTOR and the Authorized Representative to determine the viability of each sheath for transmission in accordance with the specifications of the cable manufacturer and the requirements imposed by the transmission system. This shall form part of the acceptance procedure for the cable plant. All results obtained by use of pair-scanner testing shall be collated by terminal outlet number and or riser pair number and presented to the Authorized Representative at the conclusion of the testing. Test compilation shall be initialed and dated by the CONTRACTOR's technician performing the test.
- 6. The CONTRACTOR shall utilize a level-III Fluke, PentaScanner, Wavetek or equal, twisted pair test instrument for the testing of all System Category 6 and Catagory 6A copper cabling. All Category 6 and 6A cable paths shall be tested at each jack for the following parameters and meet the requirements imposed by the TIA/EIA 568-B3 building wiring

standard, ANSI/TIA-568-C.4 Broadband Coaxial Cabling and Components Standard, and the manufacturer's written specification.

- a. All required certification tests shall be performed at 350 MHz.
- a. Category 6 and 6A data cabling systems shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above and provide for the following tests.
  - a. Wire Map.
  - b. Cable Length.
  - c. Pair-to-Pair NEXT.
  - d. Power Sum NEXT.
  - e. Attenuation.
  - f. Pair-to-Pair ELFEXT
  - g. Power Sum ELFEXT
  - h. Return Loss.
  - i. Propagation Delay.
  - j. Delay Skew
- 8. A complete cable certification report shall be provided covering all locations.
- 9. The CONTRACTOR shall compile test results into the forms that contain all applicable test data. Hard copy indicating successful testing for every location is required by the OWNER. A flash drive or disc containing the test data and appropriate application (software) to display such in a windows-based environment shall also be provided. All forms shall be neatly completed and legible when submitted. Hard copy optical traces shall be neatly and securely attached to the test results.
- 10. A copy of the test results shall be maintained by the CONTRACTOR for one (1) year from the time of acceptance by the OWNER.

## E. As-Built Documentation

- 1. All outlet locations, cable routes, core-drills and penetrations shall be documented by the CONTRACTOR on a set of as-built plans.
- 2. Outlet locations shall include their respective unique identification numbers.
- 3. As-built documentation is due within three (3) weeks after final wiring installation is accepted by the OWNER.
- 4. A copy of the as-built drawings shall be maintained by the CONTRACTOR for one (1) year from the time of acceptance by the OWNER.

## SECTION 283000 FIRE DETECTION AND ALARM

## **PART 1 GENERAL**

#### 1.01 SUMMARY

- A. The Section includes:
  - A. The section includes requirements for fire alarm detection and alarm.

## 1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section.
  - 1. National Fire Protection Association (NFPA).
    - a. NFPA 13 Sprinkler Systems.
    - b. NFPA 70 National Electrical Code.
    - c. NFPA 72 National Fire Alarm Signaling Code.
    - d. NFPA 101 Life Safety Code.
  - 2. International Fire Code 2009 Version.
  - 3. Underwriters Laboratories (UL).
    - a. UL 268 Smoke Detectors for Fire Alarm Signaling SystemS.
    - b. UL 497 B Protectors for Data Communications and Fire Alarm Circuits.
    - c. UL 864 Control Units and Accessories for Fire Alarm Systems.
    - d. UL 1424 Cables for Power-Limited Fire Alarm Circuit.
    - e. UL 1971 Signaling Devices for the Hearing Impaired.

#### 1.03 SUBMITTALS

- A. Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be rejected as incomplete.
  - 1. The product data shall be provided as individual PDFs for each Section, unless otherwise noted for specific items. Each PDF shall be numbered to match the specification Section numbers. Submittals not itemized and labeled as specified will be rejected as incomplete.
  - 2. A submittal is required for each product specified. Each individual product submittal shall have the corresponding Reference Keynote Number (example 263000.G01) typewritten in the upper right hand corner of the submittal. The submittals within each Section tab shall be in the same sequential order as they are listed in the specification Section. Submittals not containing the Reference Keynote Number will be rejected as incomplete.
  - 3. No typical submittals will be accepted. Each submittal shall be project specific and clearly identify specifically which components or parts are being submitted for approval. Any product submittals, such as a catalog sheet, which do not clearly identify which components or parts are being submitted for approval, will be rejected as incomplete.
  - 4. Submittals in PDF shall include an index, table of contents, or bookmarks with hyperlinks to the associated page of all submitted items. Index shall include each product specified with their corresponding Reference Keynote Number. Electronic submittals not containing a linked index, table of contents, or bookmarks will be rejected as incomplete.

#### B. Product Data.

- 1. Pursuant to Section 013300 Submittal Procedures.
- 2. Manufacturer's data including materials of construction, methods of installation and related information for each item specified in PART 2 PRODUCTS.

## 1.04 PERMITTING AND SUBMITTALS TO THE AUTHORITY HAVING JURISDICTION (AHJ)

- A. The CONTRACTOR is responsible to provide drawings to the local jurisdiction having authority for approval and permitting. The drawings shall include at a minimum the voltage drop calculations and battery calculations. The CONTRACTOR shall be responsible for all fees required for plan review and permitting. The ENGINEER will provide a copy of the Contract Drawings related to the Fire Alarm System for the CONTRACTOR'S use.
- B. A copy of the Product Data and Quality Assurance/Control Submittals shall be provided to the AHJ. In addition, a copy of the Contract Documents shall be included. The Contractor shall make clarifications or revisions as directed by the AHJ. All comments received from the AHJ shall be submitted immediately to the Engineer for review.

## 1.05 CONTRACTOR DESIGN REQUIREMENTS

- A. The CONTRACTOR shall be responsible for providing final design of the fire alarm system. The contract documents show the general nature of the fire alarm system. The CONTRACTOR shall provide all fire alarm devices required for a complete system in accordance with NFPA 72 and to the satisfaction of the AHJ. Design shall include the following:
  - 1. Quantity and location of all initiation devices.
  - 2. Quantity and location of all notification devices.
  - 3. Signaling line circuit (SLC) and initiating device circuit (IDC) design, including voltage drop calculations.
  - 4. Battery sizing and selection.

#### 1.05 SYSTEM REQUIREMENTS

- A. The CONTRACTOR shall be responsible for providing a complete fire alarm including drawings and calculations suitable for obtaining a permit.
- B. The existing fire alarm system is a Cerberus Pyrotronics Fire Alarm Control Panel.
- C. All new fire alarm devices shall match the existing manufacturer and integrate seamlessly with the existing fire alarm system.

## 1.06 SYSTEM REQUIREMENTS

- A. The CONTRACTOR shall be responsible for providing a complete fire alarm including drawings and calculations suitable for obtaining a permit.
- B. The existing fire alarm system is a Honeywell Silent Knight 6820 Fire Alarm Control Communicator.
- C. All new fire alarm devices shall match the existing manufacturer and integrate seamlessly with the existing fire alarm system.

#### **PART 2 PRODUCTS**

## 2.01 MATERIALS

#### A. Horn Strobe (283000.H02).

- 1. Shall be UL 1971 listed.
- 2. Wall or ceiling mount style.
- 3. Strobes shall match specifications for visual strobes.
- 4. Color shall be red.
- 5. Shall be labeled "ALERT".

#### B. Visual Strobe (283000.V01).

- 1. Visual notification appliances shall be UL 1971 Listed.
- 2. Notification appliances shall be wall or ceiling mount style.
- 3. Notification appliances shall produce a minimum flash rate of 60 flashes per minute over the UL regulated voltage range of 16 to 33 VDC and shall incorporate a Xenon flashtube.

Notification appliances shall have four (4) field selectable candela settings of 15, 30, 75 and 110 candela.

- 4. Notification appliances shall be rated for 24 VDC.
- 5. Notification appliance color shall be red.
- 6. Shall be labeled "ALERT" and shall serve as both fire alarm notification and mass notification.

## E. Notification Appliance Circuit Conductors (283000.N01).

- 1. Notification Appliance Circuit (NAC) Conductors shall be copper, un-twisted, unshielded. Conductor color shall be red (+) and black (-).
- 2. NAC Conductor material shall be stranded copper.
- 3. Shall be rated for outdoor use where outdoor installations are shown on the DRAWINGS.
- 4. NAC Conductors shall be plenum rated.
- 5. NAC Conductor size shall be 14/2 AWG.
- 6. NAC Conductor insulation shall be PVC.
- 7. NAC Conductor jacket cover shall be PVC. Jacket color shall be red and black.
- 8. NAC Conductors shall be Southwire FPLP and FPLR, or approved equal.

## F. Signaling Line Circuit Conductors (283000.S01).

- 1. Signaling Line Circuit (SLC) Conductors shall be copper, twisted unshielded pair. Conductor color shall be red (+) and black (-).
- 2. SLC conductors between buildings shall be twisted shielded pair, rated for outdoor use.
- 3. SLC Conductor material shall be stranded copper.
- 4. Shall be rated for outdoor use where outdoor installations are shown on the DRAWINGS.
- 5. SLC Conductors shall be plenum rated.
- 6. SLC Conductor size shall be 16/2 AWG.
- 7. SLC Conductor insulation shall be PVC.
- 8. SLC Conductor jacket cover shall be PVC. Jacket color shall be red and black.
- 9. SLC Conductors shall be Southwire FPLP and FPLR, or approved equal.

#### PART 3 EXECUTION

## 3.01 INSTALLATION

- A. General Requirements.
  - All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.
  - 2. All devices which contain end of line resistors shall be marked with a label on the device cover. The label shall read: "EOLR".
  - 3. Fire alarm circuit conductors shall not be twisted when spliced with a wire nut.
  - All Fire Alarm System junction boxes shall be red.
  - 5. Fire Alarm System wire and cable shall be arranged in a neat manner and securely supported in cable groups.
  - 6. Fire Alarm System Wiring shall be protected from sharp edges and corners.
  - 7. Coordination is the responsibility of the CONTRACTOR. If a conflict exists for the mounting location of devices, the CONTRACTOR shall bring it to the ENGINEER's attention during the rough-in phase and the ENGINEER shall provide direction. Failure to coordinate conflicts during the rough-in phase will result in relocation of devices at the CONTRACTOR's expense.

- 8. Devices shall be installed level and plumb. Devices shall be brought out plumb with the wall surface via UL listed spacers approved for this purpose if necessary.
- 9. The position of devices, as shown on the Drawings, are general locations only unless dimensioned. The CONTRACTOR is responsible to coordinate with various trades to ensure no conflict exists.
- 10. All strobes shall be synchronized.
- All testing and demonstration shall be performed to the satisfaction of the AHJ and the Fire Marshal.

#### B. Cable Installation.

- 1. Neatly group cables together that terminate on the same fire alarm hardware. Utilize velcro cable ties.
- 2. Cable runs shall not obstruct walkways or service access to mechanical and electrical equipment. All cabling shall be self-supported and attached to the structure as required by Code. Cables shall follow a common path where possible. Sweep 90-degree bend radii shall be installed.
- 3. Cables shall be installed parallel and perpendicular to the structural elements of the building. Line of sight "spider webs" shall not be permitted.
- 4. Cables installed above accessible ceilings shall not block access to access panels, mechanical equipment, piping valves, electrical equipment, or other equipment requiring access for maintenance and service.
- 5. Cables shall not be supported by any temporary building structure, including conduit, duct work, water pipes, hydronic piping, storm water piping, T-bar ceiling tiles, and/or support wires.
- 6. Cables above accessible ceilings shall be supported every 4-6 feet.
- 7. All cables in exposed areas shall be installed in a surface raceway.
- 8. All cables within walls or soffits shall be installed in metallic conduit.

## C. Testing.

- 1. All fire alarm circuits shall be tested for open circuits and ground faults.
- All smoke detectors shall be tested using a listed smoke detector tester product.
- 3. Alarm conditions shall be simulated, and the operation of all notification devices shall be verified.
- 4. Alarm conditions which require interfacing with other systems within the building, such as the Building Automation System and Lighting Control System shall be simulated. The CONTRACTOR shall verify the correct operation of these systems after receiving an Alarm signal from the FACP.