

### **NIBLEY 12 & MENDON UTAH STAKE CENTER**

### MENDON UTAH STAKE

### 1584 WEST 3200 SOUTH NIBLEY, UTAH

Property Number: 500-2240
Project Number: 1770
Date: 10.30.18

Architect's Seal:

G. BRIAN
BOTT
No. 136728

ARCHITECT Bott Pantone Architects

620 24th Street Ogden, Utah 84401 p. 801.394.3033 ELECTRICAL Colvin Engineering Assoc.

244 W 300 N Ste 200 Salt Lake City, UT 84103 p. 801.791.1948

CIVIL Great Basin Engineers

PO Box 150048 Ogden, Utah 84415 p. 801.394.4515 LANDSCAPE Cache Landmark

95 West Golf Course Rd. #101

Logan, Utah 84321 p. 435.713.0099

STRUCTURAL ARW Engineers

1594 West Park Circle Ogden, Utah 84404 p. 801.782.6008 FIRE RDF Engineers

3668 Eastwood Dr. Salt Lake City, Utah 84109

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MECHANICAL Davis Engineering

2147 N. Rulon White Blvd. Ste #207

Ogden, Utah 84404 p. 801.782.9642 TECHNOLOGY

Spectrum Engineers 324 S. State St. Ste 400 Salt Lake City, Utah 84111

p. 800.678.7077

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### **BIDDING REQUIREMENTS**

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### **INVITATION TO BID (U.S.)**

### 1. PROJECT:

Nibley 12 & Mendon Utah Stake Center

### LOCATION:

1584 West 3200 South Nibley, Utah

### OWNER:

Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole c/o Ogden Utah PM Office PO Box 13328 Ogden, Utah 84412

### 4. CONSULTANT:

Bott Pantone Architects 620 24th Street Ogden, Utah 84401

### 5. DESCRIPTION OF PROJECT:

- A. A 21,043 s.f., single story Stake Center.
- B. Products or systems may be provided under a Value Managed Relationship (VMR) the Owner has negotiated with the supplier. VMR products and systems are indicated as such in the Specifications.
- **6. TYPE OF BID:** Bids will be on a lump-sum basis. Segregated bids will not be accepted.
- 7. **TIME OF SUBSTANTIAL COMPLETION:** The time limit for substantial completion of this work will be three hundred sixty (360) calendar days and will be as noted in the Agreement.
- **8. BID OPENING:** Sealed bids will be received until 2:00 p.m. on November 15, 2018 at the Ogden PM Office located at 435 N. Wall Ave., Ogden, Utah. Bids will be publicly opened at that time.

### 9. BIDDING DOCUMENTS:

- A. Bidding Documents may be examined at the following plan room locations:
  - 1. McGraw-Hill Construction Dodge at: <a href="https://www.construction.com/projectcenter/">www.construction.com/projectcenter/</a>
  - 2. Mountainlands Plan Room SLC 801-288-1188 583 West 3560 South Ste 4 Fax 801-288-1184 Salt Lake City, Utah 84115
- B. Bidding Documents may be obtained at the Architect's office and are to be returned in good condition within five days of bid opening.
- 10. BID BOND: Bid security in the amount of 5 percent (5%) of the bid will accompany each bid in accordance with the Instruction to Bidders.

- 11. BIDDER'S QUALIFICATIONS: Bidding by the General Contractors will be by invitation only.
- 12. **OWNER'S RIGHT TO REJECT BIDS:** The Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

### **INSTRUCTIONS TO BIDDERS (U.S.)**

### 1. DEFINITIONS:

- A. The definitions set forth in Section 1 of the General Conditions are applicable to the documents included under Bidding Requirements.
- B. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The proposed Contract Documents consist of the documents identified as Contract Documents in the Form of Agreement, except for Modifications. The Bidding Requirements are those documents identified as such in the proposed Project Manual.
- C. Addenda are written or graphic documents issued by the Architect prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Form of Agreement upon execution of the Contract.

### 2. BIDDER'S REPRESENTATIONS:

- A. By submitting a bid, the bidder represents that
  - Bidder has carefully studied and compared the Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents,
  - 2) Bidder has thoroughly examined the site and any building located thereon, has become familiar with local conditions which might directly or indirectly affect the contract work, and has correlated its personal observations with the requirements of the proposed Contract Documents, and
  - 3) Bid is based on the materials, equipment, and systems required by the Bidding Documents without exception.

### 3. BIDDING DOCUMENTS:

### A. Copies

- 1) Bidding Documents may be obtained as set forth in the Invitation to Bid.
- 2) Partial sets of Bidding Documents will not be issued.
- 3) Bidders will use complete sets of Bidding Documents in preparing bids and make certain that those submitting sub-bids to them have access to all portions of the documents that pertain to the work covered by sub-bid, including General Conditions, Supplementary Conditions, and Division 01. Bidder assumes full responsibility for errors or misinterpretations resulting from use of partial sets of Bidding Documents by itself or any sub-bidder.
- B. Interpretation or Correction of Bidding Documents
  - Bidders will request interpretation or correction of any apparent errors, discrepancies and omissions in the Bidding Documents.
  - 2) Corrections or changes to Bidding Documents will be made by written addenda.

### C. Substitutions and Equal Products

- Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
- 2) The terms 'Acceptable Manufacturers', 'Approved Manufacturers 'Suppliers', Installers' and 'VMR (Value Managed Relationship) Manufacturers / Suppliers / Installers' are used throughout the Project Manual to differentiate among the options available to Contractor regarding specified products, manufacturers, and suppliers. See Section 016000 for options available regarding acceptance of equal products.
- 3) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding Documents.
- 4) Architect is only authorized to consider requests for approval of equal products to replace specified products in Sections where the heading 'Acceptable Manufacturers' is used and statement, 'Equal as approved by Architect before bidding. See Section 016000' or 'Equal as approved by Architect before installation. See Section 016000, 'appears. In Sections where the afore-mentioned statements do not appear and a different heading is used, Architect is authorized as Owner's representative to decline consideration of requests for approval of equal products. Approvals of

equal products in such Sections must be made by Owner and will generally be for subsequent Projects.

D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than one week prior to bid opening or by fax no later than 48 hours prior to bid opening.

### 4. BIDDING PROCEDURES:

- A. Form and Style of Bids
  - 1) Use Owner's Bid Form.
  - 2) Fill in all blanks on Bid Form. Signatures will be in longhand and executed by representative of bidder duly authorized to make contracts.
  - 3) Bids will bear no information other than that requested on bid form. Do not delete from or add to the information requested on the bid form.

### B. Bid Security

- 1) Each bid will be accompanied by a bid bond naming Owner, as listed in the Agreement, as obligee. If Bidder refuses to enter into a Contract or fails to provide bonds and insurance required by the General Conditions, amount of bid security will be forfeited to Owner as liquidated damages, not as a penalty.
- 2) Bid bond will be issued by a surety company meeting requirements of the General Conditions for surety companies providing bonds and will be submitted on AIA Document A310, Bid Bond or AIA authorized equivalent provided by surety company. The attorney-in-fact who executes the bond on behalf of the surety will affix to the bond a certified and current copy of the power of attorney.
- 3) Owner may retain bid security of bidders to whom an award is being considered until
  - a. Contract has been executed and bonds have been furnished,
  - b. Specified time has elapsed so bids may be withdrawn, or
  - c. All bids have been rejected.

### C. Submission of Bids

Submit bid in sealed opaque envelope containing only bid form and bid security. Envelopes will be sealed, bear bidder's name, and include the following:

### BID FOR

### Nibley 12 & Mendon Utah Stake Center 5002240-17-010201

If bid is sent by mail, enclose sealed envelope in separate mailing envelope with notation 'SEALED BID ENCLOSED' on face.

- 2) It is bidder's sole responsibility to see that its bid is received at specified time. Bids received after specified bid opening time will be returned to bidders unopened.
- 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.

### D. Modification or Withdrawal of Bid

- 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
- 2) Prior to bid opening, bidders may withdraw bid by written request or by reclaiming bid envelope.
- 3) Prior to bid opening, bidder may mark and sign on the sealed envelope that bidder acknowledges any or all Addenda.

### 5. CONSIDERATION OF BIDS:

- A. Opening of Bids See Invitation to Bid.
- B. Rejection of Bids Owner reserves right to reject any or all bids and to waive any irregularity therein.
- C. Acceptance of Bid
  - 1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.
  - 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform

and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

### 6. POST-BID INFORMATION:

A. The conditionally accepted bidder submitting a bid involving subcontractors will submit its list of proposed subcontractors in a meeting to be held immediately after bid opening.

### 7. PERFORMANCE BOND AND PAYMENT BOND:

- A. Bond Requirements Performance Bond and Labor and Material Payment bond will be required for this Project as specified in the General Conditions.
- B. Time of Delivery of Bonds Bonds will be delivered to Owner with Agreement signed by bidder.

### 8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

A. Agreement form will be "Agreement Between Owner and Contractor for a Fixed Sum (U.S.)" provided by Owner.

### 9. MISCELLANEOUS:

- A. Pre-Bid Conference
  - 1) A pre-bid conference will be held at a time and place to be announced.
- B. Liquidated Damages Conditions governing liquidated damages are specified in the General Conditions and in the Supplementary Conditions.
- C. Exemption from local taxes See Supplementary Conditions

END OF DOCUMENT

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### **INFORMATION AVAILABLE TO BIDDERS (U.S.)**

### 1. GEOTECHNICAL DATA

- A. Geotechnical Report -
  - Owner has secured the services of a geotechnical engineer to aid in design of the Project. Following conditions apply
    - a) A geotechnical report has been prepared by A Cache Corp., referred to as the Geotechnical Engineer.
    - b) A copy of this report will be issued to each invited Contractor.
    - c) This report was obtained solely for use in design by Consultant and is not a part of the Contract Documents. It is not intended that Contractor rely on geotechnical engineer's report.
    - d) Reports are provided for Contractor's information but are not a warranty of subsurface conditions.
  - 2) Prior to bidding, Contractor may make his own subsurface investigations to satisfy himself with site and subsurface conditions.

END OF DOCUMENT

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### SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: Nibley 12 & Mendon Utah Stake Center	Date:
Stake: Mendon Utah Stake	Project No: <u>500-2240</u>
General Contractor:	
General Contractor is to provide the names of the following subcontractors an immediately following the bid opening:	nd suppliers to the Owner's Project Manager
VMR SUBCONTRACTORS	
Roofing	
Doors, Frames & Hardware	
Storefronts	
Wood Flooring	
Millwork	
SUBCONTRACTORS AND SUPPLI	ERS
Grading / Site work	
Site Utilities	
Demolition	
Paving	
Termite Control	
Site Concrete	
Fencing	
Irrigation System	
Landscaping	
Building Concrete	
Masonry	
Structural Steel	
Framing	
Trusses	
Insulation	
EIFS	
Soffit / Fascia	
Steeple	

Drywall	
Ceramic Tile	
Acoustical Tile	
Painting	
Wall Coverings	
Draperies	
Fire Sprinklers	
Plumbing	
HVAC	
Electrical	
Controls	
Sound / Satellite	

EQU	L PRODUCT APPRO	OVAL REQUEST I	<b>FORM</b> (U.S.)	
Project	lame: Nibley 12 & Mendon Uta	h Stake Center	Request Number:	
TO:				
FROM:				
an Add		ation as defined in the Ger	ncluded in a bid or used in the Work until it appears in peral Conditions. See Instructions To Bidders Paragraph	
PROPO	ED EQUAL PRODUCT:			
Specifi	tion Section:			
Specifi	l Products:			
Propos	d Product:			
The Ur 1. 2. 3. 4. 5.	Undersigned certifies:  Proposed equal product has been fully investigated and determined to be equal or superior in all respects to specified products.  Same warranty will be furnished for proposed equal product as for specified products.  Same maintenance service and source of replacement parts, as applicable, is available.  Proposed equal product will have no adverse effect on other trades and will not affect or delay progress schedule.  Proposed equal product does not affect dimensions and functional clearances.			
ATTAC	MENTS:			
Include 1. 2.	nclude any changes necessary to ecessary to the original Project copies of details, elevations, croshow changes necessary to accoriginal Drawings.	o correctly specify the pro Manual Section. ss-sections, and other elen ammodate proposed equal technical data, installation	ual product would be specified, rewritten or red-lined to cosed equal product. Identify completely changes nents of the Project Drawings redone as necessary to product. Identify completely the changes from the and maintenance instructions, test results, and other equirements of the Contract Documents.	
SIGNE		ripiete comorniance with r	equirements of the contract Documents.	
SIGNE				
			Fax	
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REVIEW COMMENTS:	
Accepted. See Addenda Number	
Submission Not In Compliance With Instructions. Respond to attached comments and resubmit.	
Proposed Equal Product Not Acceptable. Use specified products.	
Not Reviewed. Submission received too late. Use specified products.	
ADDITIONAL COMMENTS:	
BY: DATE:	

### BID FORM FOR GENERAL CONTRACT WORK (U.S.)

### PROJECT IDENTIFICATION:

Nibley 12, & Mendon Utah Stake Center, 1584 West 3200 South, Nibley, Utah, 5002240-17-010201

### OWNER:

Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner") Ogden PM Office, PO Box 13328, Ogden, Utah 84412

### ARCHITECT:

Bott Pantone Architects, 620 24th Street, Ogden, Utah 84401

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- 1. In submitting this Bid, Bidder represents that:
  - a. If this Bid is accepted, Bidder will enter into an agreement with Owner to perform and furnish the Work described in the Bidding Documents for the Bid Price and within the Time of Substantial Completion indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
  - b. Bidder has carefully examined Set(s) Number \_\_\_\_\_ of the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and the Specifications, entitled <u>Nibley 12 & Mendon Utah Stake Center</u>, the Drawings entitled <u>Nibley 12 & Mendon Utah Stake Center</u> and dated <u>October 30, 2018</u>, and including sheets numbered <u>G101</u> through FA101, and addenda numbers \_\_\_\_\_\_.
  - c. Bidder has examined the site of the work, existing conditions, and all other conditions affecting the work on the above-named Project.
  - d. Bidder has carefully correlated the information known to Bidder and information and observations obtained from visits to the site with the Bidding Documents.
  - e. Bidder is familiar with federal, State, and local laws and regulations applicable to Project.
  - f. Bidder guarantees there will be no revisions or withdrawal of bid amount for forty-five (45) days after the bid opening.

2.	Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents for the lump-sum of:				
				_Dollars	
	(\$	<u>-</u>	).		
3.	Bidder agrees to achieve su	ubstantial completion of the V	Work within the number of days indicated in the Invitation to Bid.		
4.	Enclosed is a Bid Bond for	not less than five percent (59	%) of the bid.		
	RESPECTFULLY SUBM				
		Signature			
		Printed name			
		Title			
		Company name			
		Business Address			
Da	te	City, State, and Zip Code			
Lic	ense No.	Telephone	Fax		

Contact Email Address

Unit Pricing:	g: Cost per cubic yard to remove soft soils and replace with compacted engineered fill (See 01 2100 and 01 2200):		
		Dollars	
(\$	).		

### CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

## PROJECTS FOR: CORPORATION OF THE PRESIDING BISHOP OF THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

Building Name:	Nibley 12 & Mendon Utah Stake Center		
Building Plan Type:	New Heritage 09T SC		
Building Address:	1584 West 3200 South, Nibley, Utah		
Building Owner:	Corporation of the Presiding Bishop of TI corporation sole.	ne Church of Jesus Christ of Latter-day Saints, a L	Jtah
Project Number:	500-2240		
Completion Date:			
certify that on the above		pest knowledge, information, inspection, and belic building materials were specified in the construc	
Project Consultant an	d Principal in Charge (signature)	Date	
Bott Pantone Archited	ets		
Company Name			
		best knowledge, information, inspection, and be building materials were used in the construction.	
General Contractor (s	ignature)	Date	
Company Name			

### **GENERAL CONDITIONS**

For a Fixed Sum (U.S.)

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### **SECTION 1 - GENERAL PROVISIONS**

### 1.1 DEFINITIONS

- A. Adverse Weather: weather conditions that are seasonally abnormal and could not have been reasonably anticipated.
- B. <u>Agreement:</u> the document entitled "Agreement Between Owner and Contractor for a Fixed Sum (U.S.), executed by Owner and Contractor for performance of the Work.
- C. Architect: the entity identified as such in the Agreement.
- D. <u>Change In The Work:</u> a modification to the requirements of the Contract Documents or a delay in Substantial Completion resulting from an instruction from Owner or Architect to Contractor or from another event or circumstance.
- E. <u>Change Order:</u> a written instrument prepared by Architect and signed by Owner, Contractor, and Architect stating their agreement upon the following: (1) the occurrence of a Change in the Work; (2) the amount of the adjustment, if any, in the Contract Sum as a result of the Change in the Work; and (3) the extent of the adjustment, if any, in the Contract Time as a result of the Change in the Work.
- F. <u>Construction Change Directive:</u> a written order prepared by Architect and signed by Architect and Owner which: (1) orders a Change in the Work if the terms of a Change Order cannot be agreed upon prior to performance of a Change in the Work described in Section 7.1 or after occurrence of an event or circumstance described in Section 7.2; and (2) states a proposed basis for adjustment, if any, in the Contract Sum, the Contract Time, or both, resulting from the Change in the Work.
- G. Contract Documents: the documents identified as such in the Agreement.
- H. Contract Sum: the total amount set forth in the Agreement payable by Owner to Contractor for performance of the Work.
- I. Contract Time: the period of time set forth in the Agreement for the Substantial Completion of the Work.
- J. <u>Contractor:</u> the entity identified as such in the Agreement.
- K. <u>Day:</u> calendar day unless otherwise specifically defined.
- L. <u>Direct Costs:</u> actual costs for labor, materials, equipment, insurance, bonds, subcontract costs and onsite supervision relating to the Project. They do not include labor costs for project managers or other off-site administration.
- M. <u>Drawings:</u> the documents identified as such in the Agreement.
- N. <u>Field Change:</u> a written order prepared by Architect and signed by Architect and Contractor for a minor Change in the Work consistent with the general intent of the Contract Documents costing \$1,000 or less, resulting in no time extension, and which is necessary to avoid delaying the Work.
- O. <u>Modification:</u> a written amendment to the Contract Documents in the form of a:
  - 1. Change Order;
  - 2. Construction Change Directive; or
  - 3. Field Change.
- P. Owner: the entity identified as such in the Agreement.

- Q. <u>Project:</u> the total construction designed by Architect of which the Work performed under the Contract Documents may be the whole or a part.
- R. <u>Product Data:</u> standard illustrations, schedules, performance charts, instructions, brochures, diagrams, and other information furnished by Contractor to illustrate details regarding materials or equipment to be used in the Work, or the manner of installation, operation, or maintenance of such materials or equipment.
- S. Project Manual: the document identified as such in the Agreement.
- T. <u>Samples And Mock-ups:</u> physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- U. <u>Shop Drawings:</u> drawings, diagrams, illustrations, schedules, performance charts, fabrication and installation drawings, setting diagrams, patterns, templates, and other data which illustrate some portion of the Work and confirm dimensions and conformance to the Contract Documents specially prepared by Contractor or any Subcontractor, manufacturer, supplier, or distributor.
- V. Specifications: the documents identified as such in the Agreement.
- W. <u>Subcontractor:</u> any entity supplying labor, materials, equipment, construction or services for the Work under separate contract with Contractor or any other Subcontractor.
- X, <u>Submittals:</u> Shop Drawings, Product Data, Samples and Mock-ups and any other documents or items furnished by Contractor or its Subcontractors to Owner or Architect to demonstrate how any portion of the Work will be accomplished or the type of materials or products that will be used in the Work.
- Y. <u>Substantial Completion:</u> Completion of the Work to a point where Owner can use the Work for its intended purposes. The date of Substantial Completion is the date certified as such by Architect in accordance with the Contract Documents.
- Z. Work: all labor, materials, equipment, construction, and services required by the Contract Documents.
- AA. <u>Written Notice</u>: notice in writing given from one party to the other at the addresses or facsimile numbers listed in the Agreement, or at such other addresses or facsimile numbers as the parties will designate from time to time by Written Notice, and will be effective at the earliest of:
  - 1. The date of personal delivery to the other party with signed acknowledgment of receipt; or
  - 2. The date sent by facsimile transmission to the other party provided receipt of the facsimile is verified by an electronic confirmation report by the party sending the facsimile transmission and further provided that a confirmation copy is sent to the other party by courier or by registered or certified mail within twenty-four (24) hours after the time and date of the facsimile transmission; or
  - 3. The date of receipt by the other party as stated on the return receipt if sent by registered or certified mail, or by courier.

### 1.2 CORRELATION AND INTENT OF CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to require Contractor to provide all labor, materials, equipment, construction, and services necessary for the proper execution and completion of the Work. The Contract Documents are complementary and what is required by any one will be as binding as if required by all. Contractor will perform the Work in accordance with the requirements expressly set forth in or reasonably inferable from the Contract Documents.
- B. The organization of the Contract Documents is not intended to control Contractor in dividing the Work among Subcontractors or to establish the extent of the Work to be performed by any trade.
- C. Words used in the Contract Documents that have well known technical or trade meanings are used therein in accordance with such recognized meanings.
- D. In the interest of brevity, the Contract Documents may 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.

### 1.3 OWNERSHIP AND USE OF CONTRACT DOCUMENTS

The Drawings, the Project Manual, and copies thereof are the property of Owner. Contractor will not use these documents on any other project. Contractor may retain one copy of the Drawings and the Project Manual as a contract record set and will return or destroy all remaining copies following final completion of the Work.

### 1.4 PUBLIC STATEMENTS REGARDING PROJECT

Contractor will not make any statements or provide any information to the media about the Project without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.

### 1.5 OWNERSHIP AND USE OF RENDERINGS AND PHOTOGRAPHS

Renderings representing the Work are the property of Owner. All photographs of the Work, whether taken during performance of the Work or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs shall be used or distributed without written consent of the Owner

### 1.6 NO COMMERCIAL USE OF TRANSACTION OR RELATIONSHIP

Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, Sub-subcontractors or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:

- A. By referring to this Agreement, Owner, or the Project verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;
- B. By using or allowing the use of any photographs of the Project or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner in connection with any service or product; or
- C. By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Project.

Notwithstanding the foregoing, Contractor may include a reference to Owner and the services and equipment provided under this Agreement in a professional résumé or other similar listing of Contractor's references without seeking Owner's written consent in each instance; provided, that such reference to Owner, the services and equipment is included with at least several other similar references and is given no more prominence than such other references.

### 1.7 CONFIDENTIALITY / PROPERTY RIGHTS

- A. Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor for or relative to Work performed under this Agreement, such products, services, and Work of Contractor constituting works made for hire. Contractor will not reuse any portions of such items provided by Owner or developed by Contractor for Owner pursuant to this Agreement, or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its' absolute discretion.
- B. In addition, Contractor shall ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
  - 1. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
  - 2. Any information relating to contracts, agreements, business plans, budgets or other financial information of Owner to the extent such information has not been made available to the public by the Owner; and
  - 3. Any other information that is marked or noted as confidential by the Owner at the time of its disclosure.

### 1.8 COMPLY WITH INTELLECTUAL PROPERTY RIGHTS OF OTHERS

Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).

### **SECTION 2 - OWNER**

### 2.1 OWNER'S DESIGNATED REPRESENTATIVE

Owner will designate in writing a representative who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.

### 2.2 INFORMATION AND SERVICES REQUIRED OF OWNER

- A. Owner will be responsible for establishment of property lines and benchmarks for grading.
- B. Owner will furnish to Contractor any information or services it is required to furnish under the Contract Documents with reasonable promptness to avoid delay in the orderly progress of the Work.
- C. Owner will furnish to Contractor a reasonable number of copies of the Drawings, the Project Manual, and the Addenda.

### 2.3 OWNER'S RIGHT TO INSPECT THE WORK

Owner and its representatives will have the right to inspect any portion of the Work wherever located at any time.

### 2.4 OWNER'S RIGHT TO STOP THE WORK

If Contractor fails to carry out the Work in accordance with the Contract Documents or fails to correct Work which is not in accordance with the Contract Documents in a timely manner, Owner may order Contractor in writing to stop the Work, or any portion thereof, until the cause for that order has been eliminated.

### **SECTION 3 - CONTRACTOR**

### 3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- A. By executing the Agreement, Contractor represents that it has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its own observations with the requirements of the Contract Documents.
- B. Contractor will carefully review and compare the Contract Documents and any other available information relating to the Project prior to commencing and during performance of each portion of the Work and will immediately report to Architect any errors, inconsistencies, and omissions it discovers.
- C. Should Contractor or any of its Subcontractors become aware of any question regarding the meaning or intent of any part of the Contract Documents prior to commencing that portion of the Work about which there is a question, Contractor will request an interpretation or clarification from Architect before proceeding. Contractor proceeds at its own risk if it proceeds with the Work without first making such a request and receiving an interpretation or clarification from Architect. If neither Contractor nor its Subcontractors become aware of the question until after work on the relevant portion of the Work has commenced, then the following precedence will govern for purposes of determining whether resolution of the question constitutes a Change in the Work:
  - 1. The Agreement takes precedence over all other Contract Documents.
  - 2. The Supplementary Conditions take precedence over the General Conditions.
  - 3. The General Conditions and Supplementary Conditions take precedence over the Drawings and the Specifications.
  - 4. An Addendum or a Modification takes precedence over the document(s) modified by the Addendum or Modification.
  - 5. The Specifications take precedence over the Drawings.
  - 6. Within the Drawings, larger scale drawings take precedence over smaller scale drawings, figured dimensions over scaled dimensions, and noted materials over graphic indications.
- D. Contractor will give Architect notice of any additional drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work, sufficiently in advance of the need for information so as not to delay the Work.
- E. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with requirements of applicable laws, statutes, ordinances, building codes, rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance with those requirements, Contractor will immediately notify Architect in writing. Contractor will not proceed unless Owner and/or Architect effects Modifications to the Contract Documents required for compliance with such requirements. Contractor will be fully responsible for any work knowingly performed contrary to such requirements and will fully indemnify Owner against loss and bear all costs and penalties arising therefrom.
- F. Contractor will take field measurements and verify field conditions and will compare such field measurements and conditions and other information known to Contractor with the Contract Documents before ordering any materials or commencing construction activities. Contractor will immediately report errors, inconsistencies, and omissions that it discovers to Architect. If Contractor orders materials or commences construction activities before taking field measurements and verifying field conditions, Contractor will not be entitled to any compensation for additional costs to Contractor resulting from field measurements or conditions different from those anticipated by Contractor which would have been avoided had Contractor taken field measurements and verified field conditions prior to ordering the materials or commencing construction activities.
- G. If site conditions indicated in the Contract Documents or other information provided by Owner or Architect to Contractor differ materially from those Contractor encounters in performance of the Work, Contractor will immediately notify Architect in writing of such differing site conditions.
- H. Where the Contract Documents require the Contractor to provide professional services for architecture or engineering, the Contractor shall cause such services to be performed by appropriately licensed professionals.

### 3.2 SUPERVISION OF CONSTRUCTION PROCEDURES

- A. Contractor will supervise and direct the Work. Contractor will be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work. All loss, damage, liability, or cost of correcting defective work arising from the use of any construction means, methods, techniques, sequences or procedures will be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to Owner and Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and Owner has then instructed Contractor in writing to proceed at Owner's risk.
- B. Contractor will utilize its best skill, efforts, and judgment to provide efficient business administration and supervision, to furnish at all times an adequate supply of workers and materials, and to perform the Work in an expeditious and economical manner consistent with the interests of Owner.
- C. Contractor will be responsible for:
  - 1. The proper observance of property lines and set back requirements as shown in the Contract Documents;
  - 2. The location and layout of the Work as shown in the Contract Documents with respect to the position of the Work on the property and the elevation of the Work in relation to grade; and

- 3. Setting and maintaining construction stakes.
- D. Contractor will be responsible to Owner for the acts and omissions of its employees and Subcontractors as well as persons either directly or indirectly employed by Subcontractors.
- E. Contractor will not be relieved of its obligation to perform the Work in accordance with the Contract Documents as a result of any tests, inspections, or approvals by Owner, Architect or their consultants.
- F. Contractor will be responsible for inspection of portions of the Work already completed to determine that such portions are in proper condition to receive subsequent portions of the Work.
- G. Contractor recognizes that the Project site and the surrounding area is frequently visited by the public and is important to Owner's image and function and will maintain the premises free from debris and waste materials resulting from Construction. At the completion of Construction, Contractor shall promptly remove construction equipment, tools, surplus materials, waste materials and debris.

### 3.3 LABOR AND MATERIALS

- A. Unless otherwise provided in the Contract Documents, Contractor will provide and pay for all labor, materials, equipment, tools, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.
- B. Contractor will at all times enforce strict discipline and good order among those performing the Work and will not permit employment of any unfit person or anyone not skilled in the tasks assigned to them.
- C. Contractor is fully responsible for the Project and all materials and work connected therewith until Owner has accepted the Work in writing. Contractor will replace or repair at its own expense any materials or work damaged or stolen, regardless of whether it has received payment for such work or materials from the Owner.
- D. Contractor will remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, or by anyone for whose acts any of them may be liable.
- E. Contractor will be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. Architect may require Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the work meets the requirements of the Contract Documents. All such data will be furnished at Contractor's expense. This provision will not require Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at Contractor's expense.
- F. Contractor will coordinate and supervise the work performed by Subcontractors so that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. Contractor and all Subcontractors will at all times afford each trade, any separate contractor, or Owner, reasonable opportunity for the installation of Work and the storage of materials.
- G. Contractor warrants to Owner that the materials and equipment furnished for the Work will be new unless otherwise specified by the Contract Documents, and that the Work will be free from defects, and will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the discretion of Owner. If required by Architect, Contractor will furnish satisfactory evidence as to the kind and quality of the materials and equipment used in performing the Work.
- H. Owner may elect to purchase materials required for the Work. In that event, Contractor will comply with the procedures set forth in the Contract Documents relating to such materials.

### 3.4 COMPLIANCE WITH LAWS

Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public authorities relating to performance of the Work.

### 3.5 TAXES

- A. Contractor will pay all sales, use, consumer, payroll, workers compensation, unemployment, old age pension, surtax, and similar taxes assessed in connection with the performance of the Work.
- B. Owner will pay all taxes and assessments on the real property comprising the Project site.

# 3.6 PERMITS AND FEES

- A. Owner will obtain and pay for all zoning and use permits and permanent easements necessary for completion of the Work.
- B. Contractor will obtain and pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.

C. Contractor will secure any certificates of inspection and of occupancy required by authorities having jurisdiction over the Work. Contractor will deliver these certificates to Architect prior to issuance of the Certificate of Substantial Completion by Architect.

### 3.7 CONTRACTOR'S ON-SITE REPRESENTATIVE

Contractor will employ a competent representative acceptable to Owner to supervise the performance of the Work. This representative will be designated in writing by Contractor prior to commencement of work and will not be changed prior to final inspection of the Work without prior written consent of Owner. This representative will represent Contractor for all purposes, including communication with Owner.

### 3.8 CONTRACTOR'S CONSTRUCTION SCHEDULES

- A. Contractor will prepare and submit for Owner's and Architect's information Contractor's construction schedule for the Work in accordance with the requirements of the Contract Documents.
- B. Contractor will prepare and maintain a Submittal schedule which is coordinated with Contractor's construction schedule and sets forth specified times for Architect to review Submittals.

### 3.9 DOCUMENTS AND SUBMITTALS AT THE SITE

Contractor will keep at the Project site for use by Owner, Architect, or their representatives, a record copy of the Project Manual, the Drawings, all Addenda, and all Modifications. These documents will be maintained in good order and currently marked to record changes and selections made during construction. In addition, Contractor will keep at the Project site one copy of all Submittals.

#### 3.10 SUBMITTALS

- A. Submittals are not Contract Documents and do not alter the requirements of the Contract Documents unless incorporated into the Contract Documents by a Modification.
- B. Contractor will review, approve, and submit to Architect Submittals in accordance with the Contract Documents. By approving Submittals, Contractor represents that it has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that it has checked and coordinated each Submittal with the requirements of the Work and of the Contract Documents or will make such determination, verification, check, and coordination prior to commencing the relevant portion of the Work. In reviewing Submittals Architect will be entitled to rely upon Contractor's representation that such information is correct and accurate.
- C. Contractor will inform Architect in writing at the time of submission of any Submittal or portion thereof which deviates from the requirements of the Contract Documents. Contractor will provide Architect with documentation demonstrating to Architect that the Submittal is equal to or better than the specified product or work. Contractor will not be relieved of responsibility for deviations from the requirements of the Contract Documents by Architect's acceptance of a Submittal unless Contractor has informed Architect in writing of the deviation and Architect has incorporated the deviation into the Contract Documents by a Modification.
- D. Contractor will not perform any portions of the Work requiring Submittals until the respective Submittal has been reviewed and accepted in writing by Architect.
- E. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Owner will be entitled to rely upon such certifications, and neither Owner nor Architect will be expected to make any independent examination with respect thereto.
- F. Submittals not required by the Contract Documents may be returned to Contractor without action.

### 3.11 CUTTING AND PATCHING

Contractor will be responsible for any cutting, fitting, and patching that may be required to complete the Work and make its parts fit together properly.

### 3.12 ACCESS TO WORK

Contractor will permit Owner, Architect, their representatives and consultants, access to the Work wherever located at any time.

### 3.13 ROYALTIES AND PATENTS

Contractor will pay all royalties and license fees required by the Work or by Contractor's chosen method of performing the Work. Contractor will defend and hold Owner harmless from all suits or claims for infringement of any patent, license or other intellectual property rights or any loss on account thereof.

### 3.14 INDEMNIFICATION

A. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively "Claims" or "Claim"), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom,

except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner's property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.

- B. In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.
- C. In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
- D. The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

#### 3.15 PROJECT MEETINGS

Contractor will attend and participate in meetings as required by the Contract Documents.

### **SECTION 4 - ADMINISTRATION OF THE CONTRACT**

# 4.1 ARCHITECT

In the event that Owner terminates its contractual relationship with Architect, Owner will appoint in writing another architect, whose status under the Contract Documents will be that of the former Architect in all respects.

#### 4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

- A. Architect will make periodic visits to the site to familiarize itself generally with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. Although Architect is required to make periodic inspections, it is not required to make exhaustive or continuous onsite inspections. On the basis of its observations while at the site, Architect will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work. Architect's failure to observe a defect or deficiency in the Work will not relieve Contractor of its duty to perform the Work in accordance with the Contract Documents.
- B. Architect will review Contractor's payment requests and determine the amounts due Contractor in accordance with Section 9.
- C. Communications between Contractor and Owner relating to the Work will be through Architect. Communications between Owner or Contractor with Architect's consultants relating to the Work will be through Architect. Communications between Owner or Architect and subcontractors relating to the Work will be through Contractor. Communications between Contractor and any separate contractor will be through Architect, except as otherwise specified in the Contract Documents.
- D. Owner and/or Architect will have the right to reject and require removal of the following at Contractor's expense:
  - 1. Any portion of the Work that does not meet the requirements of the Contract Documents.
  - 2. Any portion of the Work damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
- E. Architect will have authority to suspend the Work, with concurrence of Owner, whenever such suspension may be necessary in its reasonable opinion to insure the proper performance of the Work.
- F. Architect will review Contractor's Submittals and will accept or take other appropriate action regarding the Submittals. Architect's review of the Submittals will be for the limited purpose of checking for general conformance with the Contract Documents and will not be conducted for the purpose of determining the accuracy and completeness of 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 Contractor. Architect's review of Submittals will not relieve Contractor of its obligations under the Contract Documents. Architect's review of Submittals will not constitute acceptance of safety precautions or construction means, methods, techniques, sequences or procedures. Architect's acceptance of a specific item will not indicate acceptance of an assembly of which the item is a component.
- G. Architect has authority to order Construction Change Directives and Field Changes in accordance with Section 7.

- H. Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by Contractor, and will review and certify or reject Contractor's final payment request.
- Architect will be the interpreter of the performance and requirements of the Contract Documents. Architect's interpretations will be in writing or in the form of drawings.
- J. Architect's decisions in matters relating to aesthetic effect will be final if consistent with the Contract Documents and approved by Owner.

#### **SECTION 5 - SUBCONTRACTORS**

### 5.1 AWARD OF SUBCONTRACTS FOR PORTIONS OF THE WORK

- A. Contractor will enter into contracts with Subcontractors to perform all portions of the Work that Contractor does not customarily perform with its own employees.
- B. Contractor will not contract with any Subcontractor who has been rejected by Owner. Contractor will not be required to contract with any Subcontractor against whom it has a reasonable objection.
- C. If Owner rejects any Subcontractor proposed by Contractor, Contractor will propose an acceptable substitute to whom Owner has no reasonable objection.
- D. Contractor will not make any substitution for any Subcontractor that has been accepted by Owner and Architect without the prior written approval of Owner and Architect.

#### 5.2 SUBCONTRACTUAL RELATIONS

- A. Contractor's responsibility for the Work includes the labor and materials of all Subcontractors, including those recommended or approved by Owner. Contractor will be responsible to Owner for proper completion and guarantee of all workmanship and materials under any subcontracts. Any warranties required for such work will be obtained by Contractor in favor of Owner and delivered to Architect. It is expressly understood and agreed that there is no contractual relationship between Owner and any Subcontractor, and under no circumstances will Owner be responsible for the non-performance or financial failure of any Subcontractor or any effects therefrom.
- B. Contractor agrees to pay the Subcontractors promptly upon receipt of payment from Owner for that portion of the funds received which represents the Subcontractor's portion of the Work completed to Contractor's satisfaction for which Owner has made payment.
- C. Contractor will require each Subcontractor to:
  - 1. Be licensed by the state in which the Project is located where such licensing is required by the governing authority;
  - 2. Be bound by the terms of the Contract Documents as far as they are applicable to the Subcontractor's work;
  - 3. Assume toward Contractor the same obligations Contractor has assumed toward Owner, including the prompt payment of its Subcontractors.
  - 4. Submit its applications for payment to Contractor in time to permit Contractor to make timely application to Owner;
  - 5. Execute claim or lien releases or lien waivers for payments made by Contractor; and
  - 6. Make all claims for Changes in the Work to Contractor in the same manner as Contractor is required to make such claims to Owner

### SECTION 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

### 6.1 OWNER'S RIGHT TO PERFORM WORK OR AWARD SEPARATE CONTRACTS

- A. Owner reserves the right to perform work itself or to award separate contracts in connection with the Project.
- B. When separate contracts are awarded, "Contractor" in the Contract Documents in each case will mean the contractor who signs each separate contract.

### 6.2 MUTUAL RESPONSIBILITY

- A. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its Work with theirs where applicable.
- B. If any part of Contractor's Work depends upon the work of any separate contractor for proper performance or results, Contractor will inspect and promptly report to Architect any apparent discrepancies or defects in such work that render it unsuitable for proper performance and results. Failure of Contractor to so inspect and report will constitute an acceptance of the work of the separate contractor as fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.
- C. Contractor will promptly remedy damage caused by Contractor or any Subcontractor to the completed or partially completed work of other contractors or to the property of Owner or other contractors.

### 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among Contractor and separate contractors as to the responsibility under their separate contracts for maintaining the Project free from waste materials and rubbish, Owner may clean the Project, allocate the cost among those responsible as Owner and Architect determine to be just, and withhold such cost from any amounts due or to become due to Contractor.

#### SECTION 7 - CHANGES IN THE WORK

### 7.1 CHANGES IN THE WORK RESULTING FROM AN INSTRUCTION BY OWNER OR ARCHITECT TO CONTRACTOR

- A. If Owner or Architect gives Contractor an instruction that modifies the requirements of the Contract Documents or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If compliance with the instruction affects the cost to Contractor to perform the Work, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in cost subject to the conditions set forth in Section 7.1, Paragraphs B through G. If compliance with the instruction delays Substantial Completion, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in Section 7.1, Paragraphs B through G and Section 7.3, Paragraph A and Contractor will be paid liquidated damages for the delay as set forth in Section 7.3, Paragraph B.
- B. If Contractor receives an instruction from Owner or Architect that Contractor considers to be a Change in the Work, Contractor, before complying with the instruction, will notify Architect in writing that Contractor considers such instruction to constitute a Change in the Work. If Architect agrees that compliance with the instruction will constitute a Change in the Work, Contractor will furnish a proposal for a Modification in accordance with Section 7.1, Paragraphs C. and D. within ten (10) days.
- C. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) as a result of an instruction by Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Owner. The breakdown will be in sufficient detail to allow Owner to determine any increase or decrease in Direct Costs as a result of compliance with the instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown and will itemize the Subcontractor's profit and overhead charges. Profit and overhead will be subject to the following limitations:
  - 1. The Subcontractor's profit and overhead will not exceed ten (10) percent of its Direct Costs on work performed. Subcontractor's profit and overhead will not exceed five (5) percent on work performed by its sub-subcontractors.
  - 2. Contractor's profit and overhead on work performed by its own crews will not exceed ten (10) percent of its Direct Costs.
  - 3. Contractor's profit and overhead mark up on work performed by its Subcontractors will not exceed five (5) percent of the Subcontractors' charges for such work.
  - 4. Amounts due Owner as a result of a credit change will be the actual net savings to Contractor from the Change in the Work as confirmed by Architect. On credit changes, profit and overhead on the originally estimated work will not be credited back to Owner. If both additions and credits are involved in a single Change in the Work, overhead and profit will be figured on the basis of net increase, if any, related to that Change in the Work.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an instruction from Owner or Architect, Contractor will include in its proposal justification to support Contractor's claim that compliance with the instruction will delay Substantial Completion.
- E. Upon receipt of Contractor's proposal for Modification, Architect and Owner will determine whether to proceed with the Change in the Work. If Architect and Owner determine to proceed with the Change in the Work, they will issue a Change Order, a Construction Change Directive or a Field Change as appropriate.
- F. Contractor agrees that if it complies with an instruction from Owner or Architect without first giving written notice to Architect as provided in Section 7.1., Paragraph B, and receiving a Change Order, Construction Change Directive or Field Change, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- G. If Contractor is instructed to perform work which it claims constitutes a Change in the Work but which Owner and Architect do not agree constitutes a Change in the Work, Contractor will comply with the instruction. Contractor may submit its claim for adjustment to the Contract Sum, the Contract Time, or both as a dispute pursuant to Section 13 within thirty (30) days after compliance with the instruction. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days after compliance with the instruction, then Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- H. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Owner will have the right to examine the Contractor's records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

### 7.2 CHANGE IN THE WORK RESULTING FROM AN EVENT OR CIRCUMSTANCE

A. If an event or circumstance other than an instruction from Owner or Architect affects the cost to Contractor of performing the Work or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If the circumstance or event affects the cost to Contractor to perform the Work and is caused by a willful or negligent act or omission of Owner or Architect, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in Contractor's cost to perform the Work resulting from the event or circumstance, subject to the conditions set forth in Section 7.2, Paragraphs B through F. If the event or circumstance delays Substantial Completion and is described in Section 7.3, Paragraph A, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in such section. If the circumstance or event delays Substantial Completion and is caused by a willful or negligent act or omission of Owner or Architect, then Contractor will be compensated for costs incident to the delay in accordance with Section 7.3,

Paragraph B. Contractor will not be entitled to any adjustment to the Contract Sum or other damages from Owner as a result of any event or circumstance unless the event or circumstance results from a willful or negligent act or omission of Owner or Architect.

- B. If a Change in the Work results from any event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will give Owner Written Notice of such event or circumstance within twenty-four (24) hours after commencement of the event or circumstance so that Owner can take such action as is necessary to mitigate the effect of the event or circumstance. Contractor will not be entitled to any adjustment in either the Contract Time or the Contract Sum based on any damages or delays resulting from such event or circumstance during a period more than twenty-four (24) hours prior to Contractor giving such Written Notice to Owner.
- C. Contractor will submit in writing any claims for an adjustment in the Contract Time and/or the Contract Sum resulting from an event or circumstance within the time limits set forth below. In the event that Contractor fails to submit its claim in writing within the time limits set forth below, then Contractor agrees it will not be entitled to any adjustment in the Contract Time or the Contract Sum or to any other damages from Owner due to the circumstance or event and waives any claim therefor.
  - 1. Claims for an adjustment in the Contract Time due to Adverse Weather will be made by the tenth (10th) of the month following the month in which the delay occurred.
  - 2. Claims for an adjustment in the Contract Time and/or the Contract Sum due to any other circumstance or event will be submitted within seven (7) days after the occurrence of the circumstance or event.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) because of an event or circumstance resulting from the willful or negligent act or omission of Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown as described in Section 7.1, Paragraph C. Any amount claimed for increased labor costs as a result of the event or circumstance must be supported by a certified payroll. Any claim for rented equipment or additional material costs must be supported by invoices.
- E. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an event or circumstance, Contractor will include with its claim copies of daily logs, letters, shipping orders, delivery tickets, Project schedules, and other supporting information necessary to justify Contractor's claim that the event or circumstance delayed Substantial Completion. If Contractor is entitled to an adjustment in the Contract Time as a result of an event or circumstance caused by the wilful or negligent act or omission of Owner or Architect, Contractor will be compensated for all costs related to the delay in accordance with Section 7.3, Paragraph B.
- F. Within thirty (30) days after receipt of Contractor's claim, Architect will either deny the claim or recommend approval to Owner. If Owner approves the claim, the adjustment in the Contract Time and/or Contract Sum will be reflected in a Change Order pursuant to Section 7.5 or a Construction Change Directive pursuant to Section 7.6. If Owner or Architect denies Contractor's claim, Contractor may submit its claim as a dispute pursuant to Section 13 within thirty (30) days of receipt of the denial of the claim. If Contractor fails to submit its claim for resolution pursuant to Section 13 within the thirty (30) day time period, then Contractor agrees it is not entitled to any adjustment in the Contract Time and/ or Contract Sum or any other damages as a result of the event or circumstance and waives any claim therefor.

#### 7.3 EXTENSIONS OF TIME

- A. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Change Order for a period of time equal to such delay:
  - 1. Labor strikes or lock-outs;
  - 2. Adverse weather;
  - 3. Unusual delay in transportation;
  - 4. Unforeseen governmental requests or requirements;
  - 5. A Change in the Work resulting from an instruction by Owner or Architect to Contractor subject to the conditions set forth in Section 7.1.; or
  - 6. Any other event or circumstance caused by the willful or negligent act or omission of Owner or Architect.
- B. Contractor will not be entitled to any compensation for delay described in Section 7.3, Paragraph A, subparagraphs 1, 2, 3 and 4. For each day of delay in Substantial Completion described in Section 7.3, Paragraph A, subparagraphs 5 and 6, Contractor will be paid liquidated damages in the amount per day set forth in the Supplementary Conditions to compensate Contractor for all damages resulting from any delay including but not limited to damages for general conditions costs, additional job site costs, additional home office overhead costs, disruption costs, acceleration costs, increase in labor costs, increase in subcontract costs, increase in materials costs, and any other costs incident to the delay. Contractor will be entitled to no other compensation relating to the delay.
- C. In no event will any time extension or cost adjustment be given on account of delay which reasonably should have been anticipated by the Contractor or in circumstances where performance of the Work is, was, or would have been, delayed by any other cause for which the Contractor is not entitled to an extension.

### 7.4 DOCUMENTATION OF CHANGES IN THE WORK

Every Change in the Work will be documented by a Change Order, a Construction Change Directive or a Field Change. If Owner, Architect and Contractor reach agreement regarding the adjustment in the Contract Sum, if any, and the adjustment in the Contract Time, if any, resulting from a Change in the Work, then the parties will execute a Change Order pursuant to Section 7.5. If Owner, Architect and Contractor cannot reach agreement regarding the adjustment in Contract Sum or the adjustment in Contract Time resulting from a Change in the Work, then Owner and Architect will issue a Construction Change Directive pursuant to Section 7.6. Field Changes require the agreement of Architect and Contractor only.

### 7.5 CHANGE ORDERS

Contractor's signature upon a Change Order is Contractor's acknowledgment that it is not entitled to any additional adjustment in the Contract Sum or the Contract Time or any other damages or compensation as a result of the Change in the Work other than that provided for in the Change Order, irrespective of whether a subsequent claim for additional compensation or time extensions relating to the Change in the Work is described as a change in the requirements of the Contract Documents, a delay, a disruption of the Work, an acceleration of the Work, an impact on the efficiency of performance of the Work, an equitable adjustment, or other claim and irrespective of whether the impact of the Change in the Work is considered singly or in conjunction with the impact of other Changes in the Work.

### 7.6 CONSTRUCTION CHANGE DIRECTIVES

- A. Contractor will promptly comply with all Construction Change Directives.
- B. Pending final resolution of any adjustment in the Contract Sum or Contract Time relating to a Construction Change Directive, the amounts proposed by Owner in the Construction Change Directive may be included in Contractor's payment requests once the work relating thereto is completed.
- C. If after the work described in the Construction Change Directive is completed, Owner, Architect, and Contractor reach agreement on adjustments in the Contract Sum, Contract Time, or both, such agreement will be reflected in an appropriate Change Order.
- D. If the parties do not reach agreement regarding an adjustment to the Contract Sum, Contract Time, or both relating to the Construction Change Directive within thirty (30) days of the completion of the work described therein, then Contractor may submit its claim for an adjustment pursuant to Section 13 within thirty (30) days of the completion of such work. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days of completion of the work described in the Construction Change Directive, then it will not be entitled to an adjustment in Contract Sum or Contract Time resulting from such work except as set forth in the Construction Change Directive and waives any claim therefor.

#### 7.7 FIELD CHANGES

Architect and Contractor will sign a Field Change order listing the Change In The Work and the Contract Sum including markups before Contractor proceeds with the Field Change.

#### 7.8 WAIVER OF CLAIMS

Except as set forth in Section 7, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time or for any damages of any kind whatsoever resulting from an instruction from Owner or Architect, any event or circumstance, or any act or omission of Owner or Architect and Contractor expressly waives any and all claims therefor.

# **SECTION 8 - TIME**

### 8.1 TIME IS OF THE ESSENCE

All time limits stated in the Contract Documents are of the essence. By executing the Agreement, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Contractor will proceed expeditiously with adequate resources and will achieve Substantial Completion within the Contract Time.

### 8.2 COMMENCEMENT OF THE WORK

Contractor will not commence work on the Project site until the date set forth in the Written Notice to proceed. However, Contractor may enter into subcontracts and secure material for the Project after receipt of the Agreement with Owner's authorized signature. Owner will issue the Written Notice to proceed within forty-five (45) days after Owner receives acceptable bonds and evidence of insurance pursuant to Section 11 unless Owner earlier terminates the Agreement pursuant to Section 14.

### 8.3 DELAY IN COMPLETION OF THE WORK

- A. For each day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Owner the amount set forth in the Supplementary Conditions as liquidated damages for Owner's loss of use of the Project and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.
- B. At the time Architect certifies that Contractor has achieved Substantial Completion, Architect will identify the remaining items to be completed for final completion of the Work and will establish with Contractor a reasonable time for completion of those items. Architect will set forth the items to be completed and the time established for their completion in a Certificate of Substantial Completion. For each day that Contractor exceeds the time allowed for completion of the items set forth in the Certificate of Substantial Completion, Contractor will pay to Owner as liquidated damages for additional administrative expenses the amount set forth in the Supplementary Conditions. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay in completing such items.

### **SECTION 9 - PAYMENTS AND COMPLETION**

#### 9.1 SCHEDULE OF VALUES

Contractor will submit to Architect a schedule of values which allocates the Contract Sum to various portions of the Work. The schedule of values will be supported by such data to substantiate its accuracy as required by Architect. This schedule, when accepted by Owner and Architect, will be used as a basis for reviewing Contractor's payment requests.

#### 9.2 PAYMENT REQUESTS

- A. Not more than once a month, Contractor will submit a payment request to Architect for Work completed, materials stored on the site, and for materials stored offsite as of the date of the payment request. The amount of the payment request will be based upon the schedule of values and will be equal to the value of the Work completed:
  - Less retention
  - 2. Less all prior amounts paid by Owner to Contractor as part of the Contract Sum; and
  - 3. Less allowable offsets.

The payment request may include Changes in the Work that have been performed by Contractor and authorized by Owner and/or Architect pursuant to Section 7. If a payment request includes materials stored offsite, Contractor will include with the payment request a list of the materials, the location where they are stored and the written request of Contractor and its performance bond surety that payment be made for such materials.

B. Contractor warrants and guarantees that upon the receipt of payment for materials and equipment, whether incorporated in the Project or not, title to such materials and equipment will pass to Owner free and clear of all liens, claims, security interests, or encumbrances. Notwithstanding this payment and passage of title, Contractor will remain responsible for all such materials and equipment until actual delivery to the project site, incorporation into the Work, and final acceptance by Owner. Contractor further warrants that no material or equipment covered by a payment request is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or any other person or entity.

### 9.3 PAYMENT REQUEST CERTIFICATION

- A. Architect will, within seven (7) days after receipt of Contractor's payment request, forward to Owner the payment request certified for such amount as Architect determines is properly due. If Architect certifies less than the full amount of the payment request, Architect will notify Contractor and Owner of Architect's reasons for withholding certification of the full amount requested.
- B. The certification of the payment request will constitute a representation by Architect to Owner based upon Architect's observations at the site and the data comprising the payment request, that the Work has progressed to the point indicated and that, to the best of Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. 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 minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by Architect. However, the certification of the payment request will not constitute a representation that Architect has:
  - 1. Conducted exhaustive or continuous on-site inspections to check the quantity or quality of the Work;
  - 2. Reviewed construction means, methods, techniques, sequences, or procedures;
  - 3. Reviewed copies of requisitions received from Subcontractors or other data requested by Owner to substantiate Contractor's right to payment; or
  - Made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.
- C. In taking action on Contractor's payment request, Owner will be entitled to rely on the accuracy and completeness of the information furnished by Contractor.

### 9.4 DECISIONS TO WITHHOLD CERTIFICATION AND PAYMENT

- A. Architect may withhold certification of a payment request in whole or in part to the extent reasonably necessary to protect Owner if, in the opinion of Architect, the representations to Owner required by Section 9.3, Paragraph B cannot be accurately made. If Architect is unable to certify payment in the amount of the payment request, Architect will notify Contractor and Owner as provided in Section 9.3, Paragraph A. If Contractor and Architect cannot agree on a revised amount, Architect will promptly certify a payment request for the amount for which Architect is able to make such representations to Owner. Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a payment request previously certified, to such extent as may be necessary in Architect's opinion to protect Owner from loss because of:
  - 1. Defective work not remedied;
  - 2. Third-party claims filed or reasonable evidence indicating probable filing of such claims;
  - 3. Failure of Contractor to make payments properly to Subcontractors for labor, materials, equipment, construction or services;
  - 4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
  - 5. Damage to Owner or another contractor for which Contractor is responsible;
  - 6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance will not be adequate to cover the cost of completing the Work and damages for the anticipated delay; or
  - 7. Contractor's persistent failure to carry out the Work in accordance with the Contract Documents.

B. Owner reserves the right to withhold payments to Contractor, subsequent to Architect's certification of any payment request, in order to protect Owner from loss due to any condition described in Section 9.4, Paragraph A, Subparagraphs 1 through 7. Upon satisfactory resolution of any such conditions, payments so withheld will be made.

### 9.5 PROGRESS PAYMENTS

- A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after Owner receives the certified payment request from Architect.
- B. Owner will make payments to Contractor by either placing the payments in the mail addressed to Contractor or by electronic transfer at Owner's discretion.
- C. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.
- D. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- E. No payment made under the Contract Documents, either in whole or in part, will be construed to be an acceptance of defective or improper materials or workmanship.
- F. In addition and notwithstanding the foregoing, Owner will also withhold and retain 10% of payments made to Contractor.
- G. Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days after Contractor achieves Substantial Completion, submits its payment request for retained funds, delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, obtains Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, and Owner receives a certificate of occupancy.

### 9.6 FINAL PAYMENT

- A. Owner will make full and final payment of the Contract Sum within thirty (30) days of the completion of all of the following requirements:
  - 1. Contractor has submitted its final payment request;
  - 2. Architect has declared to Owner in writing that the Work is complete;
  - 3. Contractor has obtained waiver and release upon final payment documents executed by all of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request; and
  - 4. Contractor has collected and provided to Owner all manufacturers' and other guaranties and warranties, properly signed and endorsed to Owner, that are required by the Contract Documents that extend for a period beyond one year after substantial completion. (Delivery of such guaranties and warranties will not relieve Contractor for any obligation assumed under any other provision of the Contract Documents.).
- B. Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made in writing pursuant to Section 7 and identified by Contractor in its affidavit as still pending.
- C. If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.

# SECTION 10 - PROTECTION OF PERSONS AND PROPERTY

### 10.1 SAFETY PRECAUTIONS AND PROGRAMS

Contractor will be responsible to Owner for initiating and supervising all safety programs in connection with the performance of the Work.

# 10.2 SAFETY OF PERSONS AND PROPERTY

- A. Contractor will take reasonable precautions to prevent damage, injury, or loss to:
  - 1. All persons on the site;
  - 2. The Work and materials and equipment to be incorporated into the Work; and
  - 3. Other property at the site or adjacent to it.
- B. Contractor will give notices and comply with applicable laws, ordinances, rules, regulations, and other lawful requirements of public authorities bearing on the safety or protection of persons and property. No work will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.
- C. Contractor will designate a responsible member of its organization at the site whose duty will be the prevention of accidents. This person will be Contractor's onsite representative unless otherwise designated in writing by Contractor to Owner and Architect

### 10.3 EMERGENCIES

In case of an emergency endangering life or threatening the safety of any person or property, Contractor may, without waiting for specific authorization from Architect or Owner, act at its own discretion to safeguard persons or property. Contractor will immediately notify Architect of such emergency action and make a full written report to Architect within five (5) days after the event.

#### 10.4 HAZARDOUS MATERIALS

In the event the Contractor encounters on the site material reasonably believed to be hazardous materials which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall be resumed in the absence of hazardous materials, or when it has been rendered harmless, by written agreement of the Owner and Contractor.

### **SECTION 11 - INSURANCE AND BONDS**

### 11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
  - 1. Workers Compensation Insurance.
  - 2. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
  - 3. Commercial General Liability Insurance ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
    - a. Limits of the greater of: Contractor's actual coverage amounts or the following:
      - 1) \$2,000,000 General Aggregate;
      - 2) \$2,000,000 Products Comp/Ops Aggregate:
      - 3) \$1,000,000 Personal and Advertising Liability:
      - 4) \$1,000,000 Each Occurrence;
      - 5) \$50,000 Fire Damage to Rented Premises (Each Occurrence).
    - b. Endorsements attached to the General Liability policy including the following or their equivalent:
      - ISO Form CG 25 03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises), describing the Agreement and specifying limits as shown above.
      - ISO Form CG 20 10 (07/04), Additional Insured -- Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
  - 4. Automobile Liability Insurance, with:
    - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
    - b. Coverage applying to "Any Auto."
- B. Contractor will provide evidence of such insurance to Owner as follows:
  - 1. Deliver to Owner a Certificate of Liability Insurance, on ACORD 25 (2010/05) Form, or equivalent:
    - a. Listing Owner as the Certificate Holder and Additional Insured on the general liability and any excess liability policies;
    - b. Attaching the ISO or equivalent endorsements set forth above to the Certificate of Liability Insurance;
    - c. Identifying the Project;
    - d. Listing the insurance companies providing coverage (All companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or higher. Companies which are not rated are not acceptable); and
    - e. Bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required in Section 11.1 as follows:
  - Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs; and
  - 2. All other insurance through Final Payment.
- D. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.
- E. Owner may, in writing and at its sole discretion, modify the insurance requirements.
- F. The cost of insurance as required above will be the obligation of Contractor. Contractor will be responsible for payment of all deductible amounts under all insurance.
- G. Owner will provide builders risk insurance for the cost of the Project. The policy will be written on an all risk basis with coverage for perils of wind, flood, earthquake, and terrorism, with exclusions standard for the insurance industry. The policy will be subject to a \$5,000 deductible per occurrence which will be the responsibility of Contractor and will not be a reimbursable expense. Owner will provide a copy of the terms and conditions of the builders risk policy to Contractor upon Contractor's request. Contractor will comply with terms, conditions, and deadlines of the builders risk policy. The terms, conditions, and deadlines of the builders risk policy shall govern coverage. In addition, when there is a loss which may be covered by the builders risk insurance policy, Contractor will comply with the following:
  - 1. Contractor will report the loss immediately to builders risk commercial insurer by calling 1-866-537-7475 and shall make such further written submissions as required and otherwise comply with all requirements of the builders risk policy.
  - 2. Contractor will report the loss immediately to the Owner.
  - 3. Contractor will immediately notify its general liability insurance carrier of the loss.
  - 4. Contractor will take all necessary and appropriate actions to protect the property and individuals from further loss, harm, and injury. In the event there are damages resulting from fire or water, restoration shall be performed only by a certified restoration contractor.

- 5. To the extent possible, Contractor will preserve and not disturb the evidence of the loss until after the builders risk commercial insurer and all interested parties and their insurance carriers have had the opportunity to view and investigate the site and loss
- 6. Contractor will cooperate with Owner and the builders risk commercial insurer in the investigation, documentation, and settlement of loss claims, including without limitation promptly responding to all requests for information and documentation from the builders risk commercial insurer and/or Owner.

#### 11.2 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

- A. Prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier, Contractor will furnish to Owner a performance bond and a labor and material payment bond each in an amount equal to one hundred percent (100%) of the Contract Sum as security for all obligations arising under the Contract Documents. Such bonds will:
  - 1. Be written on Form AIA Document A312 (1984).
  - 2. Be issued by a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under Sections 9304 to 9308, Title 31, of the United States Code as acceptable sureties or reinsurance companies on federal bonds.
  - 3. Have a penal sum obligation not exceeding the authorization shown in the current revision of Circular #570 as issued by the United States Treasury Department, i.e. "Treasury List".
  - 4. Be accompanied by a certified copy of the power of attorney stating the authority of the attorney-in-fact executing the bonds on behalf of the surety.
- B. Owner reserves the right to reject any surety company, performance bond, or labor and material payment bond with or without cause.
- C. The cost of the bonds as required above will be the obligation of Contractor.

### SECTION 12 - UNCOVERING AND CORRECTION OF WORK

#### 12.1 UNCOVERING OF WORK

Contractor will notify Architect at least twenty-four (24) hours in advance of performing work that would cover up work or otherwise make it difficult to perform inspections required by the Specifications or by applicable governing authorities. Should any such work be covered without proper notification having been given to Architect, Contractor will uncover that work for inspection at its own expense.

#### 12.2 CORRECTION OF WORK

- A. Contractor will promptly correct any portion of the Work that is rejected by Architect or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for Architect's services, and any other expenses made necessary thereby.
- B. Contractor will remedy any defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including without limitation additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses when incurred.
- C. Nothing in the Contract Documents will be construed to establish a period of limitation within which Owner may enforce the obligation of Contractor to comply with the Contract Documents. The one-year period specified above has no relationship to the time within which compliance with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

# 12.3 ACCEPTANCE OF NONCONFORMING WORK

- A. If Owner prefers to accept any portion of the Work not in conformance with the Contract Documents, Owner may do so instead of requiring removal and correction of the nonconforming Work. In that event, the Contract Sum will be reduced by an amount agreed upon by the parties that reflects the difference in value to Owner between the Work as specified and the nonconforming Work. Such adjustment may consider increased maintenance costs, early replacement costs, increased inefficiency of use, and the like and will be effective whether or not final payment has been made. Such adjustment will be reflected in a Change Order pursuant to Section 7.5.
- B. Temporary or trial usage by Owner or Architect of mechanical devices, machinery, apparatus, equipment, or other work or materials supplied under the Contract Documents prior to written acceptance by Architect, will not constitute Owner's acceptance.

# **SECTION 13 - RESOLUTION OF DISPUTES**

### 13.1 SUBMITTAL OF DISPUTE

In the event there is any dispute arising under this Agreement which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to the Director of Architecture, Engineering, and Construction, Physical Facilities Department, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any

settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorneys fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

### 13.2 CONTRACTOR TO PROCEED WITH DILIGENCE

Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations under this Agreement.

### **SECTION 14 - TERMINATION**

#### 14.1 TERMINATION BY CONTRACTOR

In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate the Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### 14.2 TERMINATION BY OWNER FOR CAUSE

Should Contractor fail to provide Owner with the bonds and certificates of insurance required by Section 11 within the time specified therein, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate the Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorneys fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### 14.3 TERMINATION BY OWNER FOR CONVENIENCE

Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate the Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the percentage of the Contract Sum equal to the percentage of the Work which Architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment\_as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### **SECTION 15 - MISCELLANEOUS PROVISIONS**

#### 15.1 GOVERNING LAW

The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules; and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other venue to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.

### 15.2 NO WAIVER

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

#### 15.3 RULE OF CONSTRUCTION

Owner and Contractor agree that the Contract Documents will be deemed to have been drafted by both Owner and Contractor and will not be construed against either Owner or Contractor because of authorship.

#### 15.4 ENFORCEMENT

In the event either party commences legal action to enforce or rescind any term of the Contract Documents, the prevailing party will be entitled to recover its attorneys fees and costs, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.

### 15.5 TESTS AND INSPECTIONS

- A. Owner and Architect have the right to have tests made when they deem it necessary. Tests conducted by Owner or Architect will be paid for by Owner. Should a test reveal a failure of the Work to meet Contract Document requirements, the cost of the test as well as subsequent tests related to the failure necessary to determine compliance with the Contract Documents will be paid for by Owner, with the cost thereof deducted from the Contract Sum by Modification.
- B. Tests will be made in accordance with recognized standards by a competent, independent testing laboratory. Materials found defective or not in conformity with Contract Document requirements will be promptly replaced or repaired at the expense of Contractor.
- C. Owner and Architect have the right to obtain samples of materials to be used in the Work and to test samples for determining whether they meet Contract Document requirements. Samples required for testing will be furnished by Contractor and selected as directed by Architect. Samples may be required from the sample's source, point of manufacture, point of delivery, or point of installation at Architect's discretion. Samples not required as a Submittal in the Specifications will be paid for by Owner. Should tests reveal a failure of the Sample to meet the Contract Document requirements, Contractor will provide other Samples that comply with the requirements of the Contract Documents.

**END OF DOCUMENT** 

# SUPPLEMENTARY CONDITIONS FIXED SUM (U.S.)

# ITEM 1 - GENERAL

- 1. Conditions of the Contract apply to each Division of the Specifications.
- 2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

### ITEM 2 - LIQUIDATED DAMAGE AMOUNTS:

- 1. The amount of liquidated damages to the benefit of the Contractor for delays under General Conditions Section 7.3, Paragraph B is \$500 per day.
- 2. The amount of liquidated damages to the benefit of the Owner for delays in Substantial Completion of the Work under General Conditions Section 8.3, Paragraph A is \$500 per day.
- 3. The amount of liquidated damages to the benefit of the Owner for delays in completing work itemized on the Substantial Completion Certificate under General Conditions Section 8.3, Paragraph B is \$250 per day.

### ITEM 3 - MISCELLANEOUS CHANGES IN GENERAL CONDITIONS

FOR PROJECTS EXCEEDING \$5 MILLION – CONTRACTOR TO PROVIDE BUILDER'S RISK INSURANCE (AND NOT OWNER)

Replace Section 11.1 Contractor's Liability Insurance of the General Conditions with the following:

### 11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
  - 1. Workers Compensation Insurance.
  - 2. Employers Liability Insurance with minimum limits of the greater of: \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit; or as required by the law of the state in which the Project is located.
  - 3. Commercial General Liability Insurance ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
    - a. Limits of the greater of: Contractor's actual coverage amounts or the following:
      - 1) \$2,000,000 General Aggregate;
      - 2) \$2,000,000 Products Comp/Ops Aggregate:
      - 3) \$1,000,000 Personal and Advertising Injury:
      - 4) \$1,000,000 Each Occurrence; and
      - 5) \$50.000 Damage to Rented Premises.
    - b. Endorsements attached to the General Liability policy including the following or their equivalent:
      - 1) ISO Form CG 25 03 (05/09), Designated Construction Project(s) General Aggregate Limit, describing the project and specifying that limits apply to each project of the contractor.
      - 2) ISO Form CG 20 10 (07/04), Additional Insured Owners, Lessees or Contractors Scheduled Person or Organization, naming Owner and Architect as additional insureds.
  - 4. Automobile Liability Insurance, with:
    - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
    - b. Coverage applying to "Any Auto" or equivalent to all owned autos, hired autos, and non-owned autos.
  - 5. Builder's Risk Insurance Policy ISO Form CP 00 20 (10/12), Builders Risk Coverage (or equivalent form) and ISO Form CP 10 30 (10/12) Causes of Loss Special Form, and ISO Form CP 11 20 (06/07) Builders Risk Collapse During Construction (or equivalent form) with Limits of Insurance in the amount of the Guaranteed

Maximum Price.

- a. Policy will cover materials stored at temporary storage locations and materials in transit.
- b. Include Owner and Subcontractors as additional insureds.
- c. Policy will be subject to a deductible of not less than \$5,000 per occurrence which will be the responsibility of Contractor and will not be included in the Cost of the Work or be a reimbursable expense.
- B. Contractor will provide evidence of such insurance to Owner as follows:
  - 1. Deliver to Owner a Certificate of Insurance on ACORD 25 (2010/05) or equivalent:
    - a. Listing Owner as the Certificate Holder and listing Owner and Architect as Additional Insureds on general liability and any excess liability policies;
    - b. Attaching the endorsements set forth above for additional insured on general liability (CG 20 10 07/04) and Designated Construction Project Aggregate Limit (CG 25 03 05/09).
    - c. Identifying the Project.
    - d. Listing the insurance companies providing coverage. All companies must be rated in A.M. Best Company's Key Rating Guide Property-Casualty, current edition, at B+ Class VII or higher. Companies that are not rated are not acceptable.
    - e. Bearing the name, address, and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic. A faxed or digital copy is also acceptable.
  - 2. Deliver to Owner a Certificate of Insurance on ACORD 27, Evidence of Property Insurance, for the Builders Risk Insurance Policy attaching the endorsement giving evidence that the Owner and all Subcontractors are listed as additional insureds on the Builders Risk Policy.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required in Section 11.1 as follows:
  - 1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs;
  - 2. Builders' Risk Insurance through Substantial Completion; and
  - 3. All other insurance through final payment.
- D. In the event of a loss, or upon request by Owner, Contractor will provide Owner with a copy of required insurance policies above.
- E. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.
- F. Owner may, in writing and at its sole discretion, modify the insurance requirements.

### ITEM 4 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

### <u>Utah</u>

# RETENTION APPLIED TO CONTRACTOR PAYMENTS FOR PROJECTS IN UTAH:

Replace section 9.5.F of the General Conditions with the following:

F. In addition and notwithstanding the foregoing, Owner may also withhold and retain 5% of payments made to Contractor. These retention funds will be held in an interest bearing account.

### PAYMENT OF RETAINED FUNDS IN UTAH:

Replace section 9.5 G of the General Conditions with the following:

G. After Contractor achieves Substantial Completion and submits its payment request for retained funds and delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, if any, and provides statutory Conditional Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days from the later of (a) the date Owner received Contractor's payment request for retained funds and fully

executed Contractor's Substantial Completion Affidavit and Consent of Surety, (b) the date a certificate of occupancy is issued; (c) the date that a building inspector having authority to issue its own certificate of occupancy does not issue that certificate but permits occupancy.

### **UTAH STATE SALES TAX:**

Add the following to the General Conditions:

- 1. Contractors should be exempt on purchases of material installed or converted into real property to be used by the Owner. The Contractor will furnish each vendor with a completed Exemption Certificate Form TC-721. The certificate will be prepared by the Contractor for each vendor in order to obtain the exemption.
- 2. The Owner's tax exempt number is 11871701-002-STC.

### UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the General Conditions:

- A. Contractor shall file with the State Construction Registry, on its own behalf and/or on behalf of Owner, a notice of intent to obtain final completion at least 45 days before the day on which the Owner or Contractor files or could file a notice of completion under Utah Code Ann. Section 38-1a-506 if:
  - 1. The completion of performance time under the original contract for construction work is greater than 120 days;
  - 2. The total original construction contract price exceeds \$500,000; and
  - 3. The original contractor or owner has not obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

### **UTAH NOTICE OF COMPLETION:**

Add the following to the General Conditions:

- A. Within five (5) calendar days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor shall file with the State Construction Registry, and copy to Owner, a notice of completion which shall include, without limitation, the following:
  - 1. The name, address, telephone number, and email address of the person filing the notice of completion;
  - 2. The name of the county in which the Project and/or Project site is located;
  - 3. The date on which final completion is alleged to have occurred:
  - 4. The method used to determine final completion; and
  - 5. One of the following:
    - a. The tax parcel identification number of each parcel included in the Project and/or Project site:
    - b. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or
    - The entry number of the building permit issued for the Project.
- B. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

### UTAH PROGRESS PAYMENTS AND FINAL PAYMENT:

Replace Section 9.5.A of the General Conditions with the following:

### 9.5 PROGRESS PAYMENTS

- A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after:
  - 1. Contractor has submitted a progress payment request;
  - 2. Contractor has obtained Conditional Waiver and Release Upon Progress Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request; and
  - 3. Owner receives the certified payment request from Architect.

Replace Section 9.6.A.3 of the General Conditions with the following:

### 9.6 FINAL PAYMENT

3. Contractor has obtained Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request;

END OF DOCUMENT

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# DIVISION 1 - GENERAL REQUIREMENTS:

01 1000	Summary
01 1100	,
01 1200	
01 1400	Work Restrictions
01 2000	Price and Payment Procedures
01 2100	Allowances
01 2200	
01 2900	Payment Procedures
01 3000	Administrative Requirements
01 3100	Project Management and Coordination
01 3200	Construction Progress Documentation
01 3300	
01 3500	Special Procedures
01 4000	Quality Requirements
01 4000	Quality Requirements
01 4200	
01 4301	
01 4523	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
01 4543	Font Water Adjusting and Balancing
01 4546	Duct Testing, Adjusting, and Balancing
01 5000	Temporary Facilities and Controls
01 5100 01 5200	Temporary Utilities Construction Facilities
01 5400 01 5600	
01 5000	Temporary Barriers and Enclosures Temporary Controls
01 5800	Project Identification
01 6000	Product Requirements
01 6100	Common Product Requirements
01 6200	Product Options
01 6400	Owner-Furnished Products
01 6600	Product Deliver, Storage, And Handling Requirements
01 7000	Execution and Closeout Requirements
01 7300	Execution
01 7400	Cleaning and Waste Management
01 7700	
01 7800	Closeout Submittals

# SECTION 01 1100 SUMMARY OF WORK

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements Summary of Work requirements.

### 1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Provisions contained in Division 01 apply to Sections of Divisions 02 through 49 of Specifications. Instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, obligations set forth in Contract Documents are obligations of Contractor.
- B. Contractor shall furnish total labor, materials, equipment, and services necessary to perform The Work in accordance with Contract Documents.

### 1.3 WORK BY OWNER

- A. Owner will furnish and install some portions of The Work with its own forces. Contractor will be provided with schedule of when these items are to be performed.
  - 1. General:
    - a. Complete work necessary to accommodate work to be performed by Owner before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work.
    - b. Store and protect completed work provided by Owner until date of Substantial Completion.
  - 2. Work furnished and installed by Owner include, but are not limited to, following:
    - a. High Security Cylinders and Cores:
    - b. Selected Commercial Toilet Accessories.
    - c. Carpet and Carpet Base.
    - d. Owner will terminate building telephone cables at terminal board.
    - e. Pews.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SUMMARY OF WORK - 1 - 01 1100

# SECTION 01 1200 MULTIPLE CONTRACT SUMMARY

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Multiple Contracts.

### 1.2 SUMMARY OF CONTRACTS

- A. Owner has issued or will issue separate contracts for operations scheduled to be completed between Notice to Proceed and Substantial Completion.
  - 1. General:
    - a. Schedule performance of work covered by such separate contracts in Contractor's Construction Schedule so as to avoid delays in Substantial Completion. Give written notice to such contractors and to Owner of any revisions to scheduled delivery and work dates at least 90 days in advance.
    - b. Complete work necessary to accommodate items provided under such separate contracts before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work including, but not limited to, cost of crews during downtime or for call backs and costs to correct substrate deficiencies.
    - c. Store and protect completed work provided under separate contracts until date of Substantial Completion.
  - 2. Accordion Folding Partitions. See Section 10 2233.
  - 3. Basketball Equipment. See Section 11 6624.
  - 4. Pews. See Section 12 6713.
  - 5. Projection Screens. See Section 11 5213.
  - 6. Sheet Carpeting. See Section 09 6816.
  - 7. Testing and Inspection. See Section 01 4523 "Testing and Inspection" for testing and inspection, and testing laboratory services for materials, products, and construction methods:
    - a. Aggregate Base. See Section 31 1123.
    - b. Air System Testing, Adjusting, and Balance. See Section 01 4546.
    - c. Asphalt Paving. See Section 32 1216.
    - d. Concrete. See Section 03 3111.
    - e. Concrete Moisture Vapor Emission and Alkalinity level. See Section 09 0503, Section 09 6466, Section 09 6519, Section 09 6813, and Section 09 6816.
    - Drill-In Mechanical Anchors / Adhesive Anchors / Screw Anchors. See Section 03 1511 and Section 04 0519.
    - g. Fill / Engineering Fill. See Section 31 2323.
    - h. Font Water System. See Section 01 4543.
    - i. Headed Concrete Anchor Studs / Deformed Bar Anchors. See Section 03 1511.
    - j. Reinforcement Bars. See Section 03 2100 (Epoxy-Coated Reinforcement Bars. See Section 03 2116).
    - k. Shop-Fabricated Wood Trusses: Metal Plate Connected Wood Trusses. See Section 06 1753.
  - 3. Tile Carpeting. See Section 09 6813.
- B. Owner has issued or will issue separate contracts for operations normally scheduled to follow Substantial Completion.
  - 1. General:
    - a. Give written notice to such contractors and to Owner of any revisions of scheduled date of Substantial Completion at least 90 days in advance. Contractor will be back charged for actual expenses incurred by Owner for failure to accurately report date of Substantial Completion.
    - Complete work necessary to accommodate items provided under such separate contracts before Substantial Completion. Contractor will be back charged for actual expenses incurred by Owner for failure to complete such work before Substantial Completion.
  - 2. Furnishings.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

# SECTION 01 1400 WORK RESTRICTIONS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Work Restrictions.

### 1.2 PROJECT CONDITIONS

- A. During construction period, Contractor will have use of premises for construction operations. Contractor will ensure that Contractor, its employees, subcontractors, and their employees comply with following requirements:
  - Confine operations to areas within Contract limits shown on Drawings. Do not disturb portions of site beyond Contract limits.
  - 2. Do not allow alcoholic beverages, illegal drugs, or persons under their influence on Project site.
  - 3. Do not allow use of tobacco in any form on Project Site.
  - 4. Do not allow pornographic or other indecent materials on site.
  - 5. Do not allow work on Project site on Sundays except for emergency work.
  - 6. Refrain from using profanity or being discourteous or uncivil to others on Project Site or while performing The Work.
  - 7. Wear shirts with sleeves, wear shoes, and refrain from wearing immodest, offensive, or obnoxious clothing, while on Project Site.
  - 8. Do not allow playing of obnoxious and loud music on Project Site.
  - 9. Do not build fires on Project Site.
  - 10. Do not allow weapons on Project Site, except those carried by law enforcement officers or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.
- B. Do not load or permit any part of the structure to be loaded with a weight that will endanger its safety. Questions of structural loading as part of construction means and methods shall be addressed by a licensed structural engineer engaged by Contractor, subject to the review by Architect.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

WORK RESTRICTIONS - 1 - 01 1400

# SECTION 01 2100 ALLOWANCES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements to prepare and process Allowances.

# 1.2 CASH ALLOWANCES

- A. Include following Allowances in bid:
  - Division 31 2000 Earth Moving.
    - a. Allow for over-excavation and removal of 300 cubic yards of existing soil from beneath pavement and replace with engineered fill as specified in Section 31 2323, to replace areas of soft subbase. Locate areas and depth of over-excavations as directed by Architect. Provide credit to Owner for any unused allowance.
- B. If actual purchase price differs from Allowance, change order will be issued adjusting Contract Sum by amount of difference.
- C. Actual purchase price is actual amount paid by Contractor, including applicable sales and use taxes, before taking into account cash discounts for prompt payment.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

ALLOWANCES - 1 - 01 2100

# SECTION 01 2200 UNIT PRICES

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Unit Prices.

### 1.2 UNIT PRICE MEASUREMENT

- A. Unit prices listed by Contractor on Bid Form will be used to price changes to Contract Sum. Such unit prices include all labor, material, equipment, overhead, profit, and taxes.
- B. Unit Price Measurement:
  - 1. Keep daily log of each Unit Price item which includes:
    - a. A description of Unit Price Item.
    - b. Quantity.
    - c. Date.
    - d. Time of Day with place for AM and PM.
    - e. Signature of person preparing log.
  - 2. Submit copy of log to Architect with daily construction reports.

### 1.3 UNIT PRICE PAYMENT

A. Contract Sum will be adjusted by change order to reflect variance, if any, of actual quantities from amount included in base bid for each Unit Price.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

**END OF SECTION** 

UNIT PRICES - 1 - 01 2200

# SECTION 01 2900 PAYMENT PROCEDURES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements to prepare and process Applications for Payments.

### 1.2 PAYMENT REQUESTS

- A. Use Payment Request forms provided by Owner.
- B. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.
- C. Request Preparation:
  - 1. Complete every entry on Payment Request form.
  - 2. Entries will match data on approved schedule of values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
  - 3. Submit signed Payment Request to Architect with current Construction Schedule.
- D. Provide following submittals before or with submittal of Initial Payment Request:
  - 1. List of Subcontractors.
  - 2. Initial progress report.
  - 3. Contractor's Construction Schedule.
  - 4. Submittal Schedule.
- E. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

### 1.3 SCHEDULE OF VALUES

- A. Submit schedule of values on Owner's standard form to Architect 20 days minimum before submission of Initial Payment Request as a necessary condition before payment will be processed. Coordinate preparation of schedule of values with preparation of Contractor's Construction Schedule. Correlate line items in Schedule of Values with other required administrative schedules and forms, including:
  - 1. Contractor's Construction Schedule.
  - 2. Payment Request form.
  - Schedule of Allowances.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

**END OF SECTION** 

# SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Project Management and Coordination on Projects.

### 1.2 PROJECT COORDINATION

- A. Project designation for this Project is LDS500-2240, Mendon Utah Stake
- B. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

### 1.3 MULTIPLE CONTRACT COORDINATION

- A. Contractor shall be responsible for accurately maintaining and reporting schedule of The Work from Notice to Proceed to date of Substantial Completion.
- B. Contractor shall be responsible for providing Temporary Facilities And Controls for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- C. Contractor shall be responsible for providing Construction Waste Management And Disposal services for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- D. Contractor shall be responsible for Final Cleaning for entire Project.

### 1.4 PROJECT MEETINGS AND CONFERENCES

- A. Preconstruction Conference:
  - Attend preconstruction conference and organizational meeting scheduled by Architect at Project site or other convenient location.
  - 2. Be prepared to discuss items of significance that could affect progress, including such topics as:
    - a. Construction schedule.
    - b. Critical Work sequencing.
    - c. Current problems.
    - d. Designation of responsible personnel.
    - e. Distribution of Contract Documents.
    - f. Equipment deliveries and priorities.
    - g. General schedule of inspections by Architect and its consultants.
    - h. General inspection of tests.
    - i. Office, work, and storage areas.
    - j. Preparation of record documents and O & M manuals.
    - k. Procedures for processing interpretations and Modifications.
    - I. Procedures for processing Payment Requests.
    - m. Project cleanup.
    - n. Security.
    - o. Status of permits.
    - p. Submittal of Product Data, Shop Drawings, Samples, Quality Assurance / Control submittals.
    - q. Use of the premises.
    - r. Work restrictions.
    - s. Working hours.

 Architect will record minutes of meetings and distribute copies to Owner and Contractor within three (3) working days.

### B. Progress Meetings:

- 1. Attend progress meetings at Project site at regularly scheduled intervals determined by Architect, at least once a month.
- Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.
- 3. Be prepared to discuss items of significance that could affect progress, including following:
  - a. Progress since last meeting.
  - b. Whether Contractor is on schedule.
  - c. Activities required to complete Project within Contract Time.
  - d. Labor and materials provided under separate contracts.
  - e. Off-site fabrication problems.
  - f. Access.
  - g. Site use.
  - h. Temporary facilities and services.
  - i. Hours of work.
  - j. Hazards and risks.
  - k. Project cleanup.
  - I. Quality and Work standards.
  - m. Status of pending modifications.
  - n. Documentation of information for Payment Requests.
  - o. Maintenance of Project records.
- Architect will prepare minutes of progress meetings and distribute copies of minutes to Owner and Contractor within three (3) working days.

### C. Pre-Installation Conferences:

- 1. Attend pre-installation conferences specified in Contract Document.
  - a. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
  - b. Request input from attendees in preparing agenda.
- 2. Be prepared to discuss following items:
  - a. Requirements of Contract Documents.
  - b. Completed work necessary for installation of items or systems.
  - c. Conditions not in compliance with installation requirements.
  - d. Installation and inspection schedule.
  - e. Coordination between trades.
  - f. Space and access limitations.
  - g. Testing.
- 3. Architect will prepare meeting minutes and distribute minutes to Owner and Contractor within three (3) working days.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

# SECTION 01 3200 CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - Administrative and procedural requirements for documenting the progress of construction during performance of the Work

### 1.2 SCHEDULING OF WORK

- A. Bar Chart Schedule:
  - 1. Submit horizontal bar chart schedule before Preconstruction Conference. Provide separate time bar for each construction activity listed on Owner's payment request form. Within each time bar, show estimated completion percentage. Provide continuous vertical line to identify first working day of each week. Show each activity in chronological sequence. Show graphically sequences necessary for completion of related portions of The Work. As The Work progresses, place contrasting mark in each bar to indicate actual completion.
  - 2. Provide copies of schedule for Architect and Owner and post copy in field office.
  - 3. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.
  - 4. Project Management Software Programs:
    - a. Any software project management program capable of Bar Chart Scheduling for projects of equal size and complexity is approved by Contractor and approved by Owner's Project Manager.
- B. Daily Construction Reports:
  - 1. Prepare daily reports of operations at Project including at least following information:
    - List of Subcontractors at site.
    - b. Approximate count of personnel at site by trade.
    - c. High and low temperatures, general weather conditions.
    - d. Major items of equipment on site.
    - e. Materials, equipment, or Owner-furnished items arriving at or leaving site.
    - f. Accidents and unusual events.
    - g. Site or structure damage by water, frost, wind, or other causes.
    - h. Meetings, conferences, and significant decisions.
    - i. Visitors to the job including meeting attendees.
    - j. Stoppages, delays, shortages, losses.
    - k. Any tests made and their result if known.
    - I. Meter readings and similar recordings.
    - m. Emergency procedures.
    - n. Orders and requests of governing authorities.
    - o. Modifications received, carried out.
    - p. Services connected, disconnected.
    - q. Equipment or system tests and start-ups.
    - r. Brief summary of work accomplished that day.
    - s. Signature of person preparing report.
  - 2. Submit daily reports to Architect at least weekly.
  - 3. Maintain copies of daily reports at field office.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

## SECTION 01 3300 SUBMITTAL PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Submittal Procedures.
- B. Related Requirements:
  - 1. Section 01 7800: 'Closeout Submittals' for administrative and procedural requirements for closeout submittals.

## 1.2 SUBMITTAL SCHEDULE

- A. Furnish submittal schedule within 20 days after receipt of Notice to Proceed, listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and Informational submittals.
  - 1. Coordinate submittal schedule with Contractor's construction schedule.
  - 2. Enclose the following information for each item:
    - a. Scheduled date for first submittal.
    - b. Related Section number.
    - c. Submittal category.
    - d. Name of Subcontractor.
    - e. Description of part of the Work covered.
    - f. Scheduled date for resubmittal.
    - g. Scheduled date for Architect's final release or approval.
- B. Print and distribute copies to Architect and Owner and post copy in field office. When revisions are made, distribute to same parties and post in same location.
- C. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.

## 1.3 SUBMITTAL PROCEDURES

- A. Coordination:
  - 1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
    - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
    - b. Coordinate transmittal of different types of submittals required for related elements of The Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  - 2. Processing Time:
    - a. Allow sufficient review time so installation will not be delayed by time required to process submittals, including time for resubmittals.
      - Allow 21 days for initial review. Allow additional time if processing must be delayed allowing coordination with subsequent submittals. Architect will promptly advise Contractor when submittal being processed must be delayed for coordination.
      - 2) If an intermediate submittal is necessary, process same as initial submittal.
      - 3) Allow 10 days for reprocessing each submittal.
      - 4) No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.
  - Identification:
    - a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.

- 1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
- 2) Include following information on label for processing and recording action taken:
  - a) Project name.
  - b) Date.
  - c) Name and address of Architect.
  - d) Name and address of Contractor.
  - e) Name and address of Subcontractor.
  - f) Name and address of supplier.
  - g) Name of manufacturer.
  - h) Number and title of appropriate Specification Section.
  - i) Drawing number and detail references, as appropriate.

#### 4. Transmittal:

- a. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using transmittal letter. On transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements, or, on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
- Submittals received from sources other than Contractor or not marked with Contractor's approval will be returned without action.

## 1.4 ACTION SUBMITTALS

#### A. Product Data:

- 1. Submit Product Data, as required by individual Sections of Specifications.
- 2. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
- 3. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
- 4. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
- 5. Submit electronic files PDF: Architect will return a PDF copy marked with action taken and with corrections or modifications required.

## B. Shop Drawings:

- Submit newly prepared graphic data to accurate scale. Except for templates, patterns, and similar full-size
  Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches.
  Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a
  minimum:
  - a. Dimensions.
  - b. Identification of products and materials included.
  - c. Compliance with specified standards.
  - d. Notation of coordination requirements.
  - e. Notation of dimensions established by field measurement.
- 2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard printed information prepared without specific reference to Project is not acceptable as Shop Drawings.
- 3. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.

## C. Samples:

- Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  - a. Mount, display, or package Samples to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
    - 1) Generic description of Sample.
    - 2) Sample source.
    - 3) Product name or name of manufacturer.
    - 4) Compliance with recognized standards.
    - 5) Availability and delivery time.

- 2. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
  - a. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
  - b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
  - Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
- 3. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
- 4. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
- Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
  - a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
  - b. Sample sets may be used to obtain final acceptance of construction associated with each set.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Informational submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required. [or] Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.
  - 1. Certificates: Describe certificates intended to document affirmations by Contractor or others that the work is in accordance with the Contract Documents, but do not repeat provisions of Parts 2 or 3.
  - 2. Delegated Design Submittals / Design Data: Describe submittals intended to demonstrate design work prepared by Contractor's licensed professionals.
  - 3. Test And Evaluation Reports: Describe submittal of test reports or evaluation service reports intended to document required tests.
  - 4. Manufacturer Instructions: Describe submittals intended to document manufacturer instructions.
  - 5. Source Quality Control Submittals: Describe submittal of source quality control documentation.
  - 6. Field Quality Control Submittals: Describe submittal of field quality control documentation.
  - 7. Manufacturer Reports: Describe submittal of Manufacturer reports as documentation of manufacturer activities.
  - 8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
  - Qualification Statements: Describe submittals intended to document qualifications of entities employed by Contractor.

#### 1.6 CLOSEOUT SUBMITTALS

- A. This title groups submittals that occur during project closeout. Coordinate with section 01 7800 Closeout Submittals.
  - 1. As Built Record Drawings as defined in the Agreement.
  - 2. Project Manual: Complete Project Manual including Addenda and Modifications as defined in General Conditions.
  - 3. Maintenance Contracts: Describe submittal of the maintenance contract specific to the Section.
  - 4. Operations & Maintenance Data: Describe submittal of operation and maintenance data necessary for products of the Section.
  - 5. Warranty Documentation: Describe submittal of final executed warranty document specific to the Section.
  - 6. Record Documentation: Describe submittal of record documentation specific to the Section.
  - 7. Software: Describe submittal system software and programming software specific to the Section.

SUBMITTAL PROCEDURES 3 01 3300

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. This title groups maintenance material required submittals specific to the Section. Items may be provided at completion of Work or submitted with section 01 7800 Closeout Submittals:
  - 1. Spare Parts: Describe spare parts necessary for Owner's use in facility operation and maintenance. 'Parts' are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.
  - 2. Extra Stock Materials: Describe extra stock materials to be provided for Owner's use in facility operation and maintenance. Extra stock materials are generally understood to be items such as ceiling tiles, flooring, paint etc.
  - 3. Tools:
    - a. Describe tools to be provided for Owner's use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

## SECTION 01 3500 SPECIAL PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Special Procedures.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. U.S. Department of Labor, Occupational Safety and Health Administration:
    - a. 29 CFR 1926 OSHA, 'Construction Industry Regulations' (January 2014 or latest version).
      - 1) 29 CFR 1926.20, 'General Safety And Health Provisions'.
      - 2) 29 CFR 1926.64, 'Hot Work Permit'.
      - 3) 29 CFR 1926.352, 'Fire Prevention'.
      - 4) 29 CFR 1926.500, 'Fall Protection'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Acceleration of Work:
  - 1. Complete The Work in accordance with Construction Schedule. If Contractor falls behind schedule, take such actions as are necessary, at no additional expense to Owner, to bring progress of The Work back in accordance with schedule.
  - 2. Owner may request proposal for completion of The Work at date earlier than expiration of Contract Time:
    - a. Promptly provide requested proposal showing cost of such acceleration of The Work. Consult with Owner and Architect regarding possible options to decrease cost of such acceleration.
    - b. If Owner determines to order acceleration of The Work, change in Contract Sum and Contract Time resulting from acceleration will be included in a Change Order.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet regulations of 29 CFR 1926 OSHA, 'Construction Industry Regulations'.
  - 2. Owner's Safety Requirements:
    - a. Personal Protection:
      - 1) Contractor shall ensure:
        - a) Positive means of fall protection, such as guardrails system, safety net system, personal fall arrest system, etc, is provided to employees whenever exposed to a fall 6 feet or more above a lower level.
        - b) Personnel working on Project shall wear hard hats and safety glasses as required by regulation and hazard.
        - Personnel working on Project shall wear long or short sleeve shirts, long pants, and hard-toed boots or other sturdy shoes appropriate to type and phase of work being performed.
    - b. Contractor Tools And Equipment:
      - 1) Contractor shall ensure:
        - Tools and equipment are in good working condition, well maintained, and have necessary guards in place.
        - b) Ground Fault Circuit Interrupters (GFCI) is utilized on power cords and tools.
        - c) Scaffolding and man lifts are in good working condition, erected and maintained as required by governmental regulations.
        - d) Ladders are in good condition, well maintained, used as specified by Manufacturer, and secured as required.

- c. Miscellaneous:
  - 1) Contractor shall ensure:
    - a) Protection is provided on protruding rebar and other similar objects.
    - b) General Contractor Superintendent has completed the OSHA 10-hour construction outreach training course or equivalent.
    - c) Implementation and administration of safety program on Project.
    - d) Material Safety Data Sheets (MSDS) are provided for substances or materials for which an MSDS is required by governmental regulations before bringing on site.
    - e) Consistent safety training is provided to employees on Project.
    - Implement and coordinate Lockout / Tagout procedures with Owner's Representative as required.
  - Report accidents involving injury to employees on Project that require off-site medical treatment to Owner's designated representative.
- d. Hot Work Permit:
  - 1) Permit shall document that fire prevention and protection requirements in 29 CFR 1926.352, 'Fire Prevention' have been implemented prior to beginning hot work operations.
  - 2) Required for doing hot work involving open flames or producing heat or sparks such as:
    - a) Brazing.
    - b) Cutting.
    - c) Grinding.
    - d) Soldering.
    - e) Thawing pipe.
    - f) Torch applied roofing.
    - g) Welding.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SPECIAL PROCEDURES - 2 - 01 3500

# SECTION 01 4000 QUALITY REQUIREMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Related Requirements:
  - Section 01 3100: 'Project Management and Coordination' for Pre-Installation Conferences for testing and inspection.
  - Section 01 3200: 'Construction Progress Documentation' for developing a schedule of required tests and inspections.
  - Section 01 3300: 'Submittal Procedures'.
  - 4. Section 01 4301: 'Quality Assurance Qualifications' establishes minimum qualification levels required.
  - 5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 6. Section 01 7300: 'Executions' for cutting and patching for repair and restoration of construction disturbed by testing and inspecting activities.
  - 7. Divisions 01 thru 49 establish responsibility for providing specific testing and inspections.

## 1.3 REFERENCES

#### A. Definitions:

- 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
- 2. Approved: To authorize, endorse, validate, confirm, or agree to.
- 3. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with requirements indicated; and having complied with requirements of authorities having jurisdiction.
- 4. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a construction operation, including installation, erection, application, and similar operations.
  - a. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of corresponding generic name.
- 5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish standard by which the Work will be judged.
- 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
- 7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- 8. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- 9. Service Provider: Agency or firm qualified to perform required tests and inspections.

- Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
- 11. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
- 12. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
- 13. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

#### B. Reference Standards:

- 1. International Code Council (IBC) (2015 or most recent edition adopted by AHJ):
  - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

## 1.4 ADMINISTRATIVE REQUIREMENTS

## A. Conflicting Requirements:

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

## B. Coordination:

1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

#### C. Scheduling:

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## 1.5 QUALITY ASSURANCE

- A. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
  - Specific quality assurance and quality control requirements for individual construction activities are specified in Sections that specify those activities and Section 01 4523. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality control procedures that facilitate compliance with Contract Document requirements.
  - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

#### B. Quality Assurance Services:

- Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- 2. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.
- C. Activities performed by Owner's Quality Assurance Testing Agency include, but are not limited to following:
  - 1. Individual Sections in Division 01 through Division 49:
    - a. Pre-Installation Conference agenda review items for:
      - 1) Schedule requirements.
      - 2) Testing and inspection requirements:

- 3) Requirements and frequency of testing and inspections.
- 4) Mock-up or sample requirements.
- 5) Submittals requirements.
- b. Quality Assurance personal qualifications.
  - 1) Qualification documentation including certificates if required.
- c. Non-Conforming Work:
  - 1) Prepare non-compliance log to track non-compliant testing or inspections.
- 2. Weekly Activities:
  - a. Summarize and track any non-compliance issues.
  - b. Provide summary report of previous week's performed Work.
- D. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed Work:
  - 1. Coordinate with individual section in Division 01 through Division 49 if there are any additional requirements or modification to these requirements:
    - a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
    - b. Notify Architect seven days in advance of dates and times when mockups will be constructed.
    - c. Demonstrate proposed range of aesthetic effects and workmanship.
    - d. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      - 1) Allow seven days for initial review and each re-review of each mockup.
    - e. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.
      - 1) Demolish and remove mockups when directed, unless otherwise indicated.

## 1.6 QUALITY CONTROL

- A. Quality Control Services:
  - 1. Quality Control will be sole responsibility of Contractor.
    - a. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor:
      - 1) They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
      - Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - b. Where services are indicated as Contractor's responsibility, engage a qualified Testing Agency to perform these quality control services.
      - 1) Contractor shall not employ same testing entity engaged by Owner, without Owner's written approval.
- B. Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300: 'Submittal Procedures'.
- C. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify Testing Agency sufficiently in advance of operations to permit assignment of personnel. Provide following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist Testing Agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require quality control by Testing Agency.
  - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
  - 1. Civil And Structural Testing:
    - a. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services'. Quality Control is sole responsibility of Contractor:
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:

- a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
- 2) Contractor bears full responsible for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.
- b. Weekly Activities:
  - 1) Ensure that non-compliance log is current.
  - 2) Provide summary reports of performed Work.

## PART 2 - PRODUCTS Not Used

## PART 3 - EXECUTION

## 3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  - 2. Comply with Contract Document requirements for Section 01 7300 'Execution' for cutting and patching.
- B. Protect construction exposed by or for Quality Assurance and Quality Control activities.
- C. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

## END OF SECTION

QUALITY REQUIREMENTS - 4 - 01 4000

## SECTION 01 4200 REFERENCES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Reference standards, definitions, specification format, and industry standards.

#### 1.2 REFERENCES

#### A. Definitions:

- 1. Approved: The term "approved," when used to convey Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- Directed: The term "directed" is a command or instruction by Architect. Other terms including "requested,"
  "authorized," "selected," "approved," and "permitted" have the same meaning as "directed."
- 3. Experienced: The term "experienced," when used with an entity, means having successfully completed a minimum often previous projects similar in size and scope to this Project; being familiar with the special requirements indicated, and having complied with requirements of authority having jurisdiction.
- 4. Furnish: The term "furnish" means supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- 5. General: Basic Contract definitions are included in the Conditions of the Contract.
- 6. Indicated: The term "indicated" refers to requirements expressed by graphic representations, or in written form on Drawings, in Specifications, and in other Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
- 7. Install: The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- 8. Installer: An "Installer" is the Contractor or another entity engaged by the Contractor, as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
- Project Site: The term "Project site" means the space available for performing construction activities. The extent
  of the Project site is shown on the Drawings and mayor may not be identical with the description of the land on
  which the Project is to be built.
- 10. Provide: The term "provide" means to furnish and install, complete and ready for the intended use.
- 11. Regulations: The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- 12. Submitted: The terms "submitted," "reported," "satisfactory" and similar words and phrases means submitted to Architect, reported to Architect and similar phrases.
- 13. Testing Agencies: A "testing agency" is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, or to report on and, if required, to interpret results of those inspections or tests.
- 14. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

## B. References Standards:

- Specification Format: Specifications will follow MasterFormat<sup>™</sup> 2004 for organizing numbers and titles. (The Construction Specifications Institute, Project Resource Manual/CSI Manual of Practice, 5<sup>th</sup> Edition. New York, McGraw-Hill, 2005).
  - a. Specification Identifications:
    - 1) The Specifications use section numbers and titles to help cross referencing in the Contract Documents.
    - Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete.
       Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

- b. Specification Language:
  - 1) Specifications should be prepared, with concern and respect for their legal status. Specifications should be Clear, Concise, Correct and Complete.
  - 2) Streamlining: Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference
- c. Sentence Structure:
  - 1) Specifications to be written in the "Imperative Mood".
    - a) The verb that clearly defines the action becomes the first word in the sentence.
    - b) The imperative sentence is concise and readily understandable.
  - 2) Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference.
- d. Abbreviated Language:
  - 1) Abbreviations should be used only on drawings and schedules where space is limited.
  - 2) Abbreviations with multiple meanings should be avoided, unless used in different disciplines where their meaning is clear from the context in which they are used.
  - 3) Abbreviations should be limited to five or fewer letters
    - a) The verb that clearly defines the action becomes the first word in the sentence.
- e. Symbols:
  - 1) Caution should apply to symbols substituted for words or terms.
- f. Numbers:
  - 1) The use of Arabic numerals rather that words for numbers is recommended.

## C. Industry Standards:

- 1. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.
- 2. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
- 3. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
- 4. Trade Association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean association names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AABC	Associated Air Balance Council	Washington	DC	(202) 737-0202	www.aabchq.com
AAMA	American Architectural Manufacturers Association	Schaumburg	IL	(847) 303-5664	www.aamanet.org
AASHTO	American Association of State Highway & Transportation Officials	Washington	DC	(202) 624-5800	www.aashto.org
AAMA	American Architectural Manufacturers Association	Schamumburg	IL	(847) 303-5774	www.aamanet.org
AASHTO	American association of State Highways and Transportation Officials	Washington	DC		www.transportation.org www.aashto.org
ACI	American Concrete Institute International	Farmington Hills	MI	(248) 848-3700	www.aci-int.org
AGA	American Gas Association	Washington	DC	(202) 824-7000	www.aga.org
AHRI	Air Conditioning Heating & Refrigeration Institute	Arlington	VA	(703) 524-8800	www.ari.org
AIA	American Institution of Architects	Washington	DC	(202) 626-7300	www.aia.org
AISC	American Institute of Steel Construction	Chicago	IL	(312) 670-2400	www.aisc.org
AISI	American Iron & Steel Institute	Washington	DC	(202) 452-7100	www.steel.org
AITC	American Institution of Timber Construction	Englewood	СО	(303) 792-9559	www.aitc-glulam.org

REFERENCES - 2 - 01 4200

AMCA	Air Movement & Control Association International	Arlington Heights	IL	(847) 394-0150	www.amca.org
ANSI	American National Standards Institute	New York	NY	(212) 642-4900	www.ansi.org
APA	APA-Engineered Wood Association	Tacoma	WA	(253) 565-6600	www.apawood.org
API	American Petroleum Institute	Washington	DC	(202) 682-8000	www.api.org
AQMD	South Coast Air Quality Management District	Diamond Bar	CA	(909) 396-2000	www.aqmd.gov
ASHRAE	American Society of Heating, Refrigerating, & Air-Conditioning Engineers	Atlanta	GA	(404) 636-8400	www.ashrae.org
ASME	American Society of Mechanical Engineers International	New York	NY	(800) 843-2763	www.asme.org
ASTM	ASTM International	West Conshohocken	PA	(610) 832-9500	www.astm.org
AWI	Architectural Woodwork Institute	Potomac Falls	VA	(571) 323-3636	www.awinet.org
AWPA	American Wood Protection Association	Birmingham	AL	(205) 733-4077	www.awpa.com
AWS	American Welding Society	Miami	FL	(800) 443-9353	www.aws.org
AWWA	American Water Works Assoc	Denver	CO	(303) 794-7711	www.awwa.org
ВНМА	Builders Hardware Manufacturers Association	New York	NY	(212) 297-2122	www.buildershardware.com
BIA	Brick Industry Association	Reston	VA	(703) 620-0010	www.bia.org
CFI	International Certified Floorcovering Installers, Inc.	Kansas City	MO	(816) 231-4646	www.cfi-installers.org
CRI	Carpet & Rug Institution	Dalton	GA	(706) 278-3176	www.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute	Schaumburg	IL	(847) 517-1200	www.crsi.org
CISPI	Cast Iron Soil Pipe Institute	Chattanooga	TN	(423) 892-0137	www.cispi.org
DHI	Door & Hardware Institute	Chantilly	VA	(703) 222-2010	www.dhi.org
DIPRA	Ductile Iron Pipe Research Association.	Birmingham	AL	(205) 402-8700	www.dipra.org
EIMA	EIFS Industry Members Association	Morrow	GA	(800) 294-3462	www.eima.com
FM	FM Global	Johnston	RI	(401) 275-3000	www.fmglobal.com
FSC	Forest Stewardship Council	Bonn, Germany		+49 (0) 228 367 66 0	www.fsc.org
GA	Gypsum Association	Hyattsville	MD	(301) 277-8686	www.gypsum.org
GS	Green Seal	Washington	DC	(202) 872-6400	www.greenseal.org
HPVA	Hardwood Plywood & Veneer Association	Reston	VA	(703) 435-2900	www.hpva.org
ICC	International Code Council	Washington	DC	(888) 422-7233	www.iccsafe.org
ICC-ES	ICC Evaluation Service	Whittier	CA	(562) 699-0543	www.icc-es.org
ICBO	International Conference of Building Officials				(See ICC)
ISO	International Organization for Standardization	Geneva, Switzerland			www.iso.org
ISSA	International Slurry Surfacing Association	Annapolis	MD	(410) 267-0023	www.slurry.org
KCMA	Kitchen Cabinet Manufactures Association	Reston	VA	(703) 264-1690	www.kcma.org
LPI	Lightning Protection Institute	Maryville	МО	(800) 488-6864	www.lightning.org
MFMA	Maple Flooring Manufacturers' Association	Deerfield	IL	(888) 480-9138	www.maplefloor.org
MSS	Manufacturer's Standardization Society of The Valve and Fittings Industry	Vienna	VA	(703) 281-6613	www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers	Glen Ellyn	IL	(630) 942-6591	www.naamm.org
NEC	National Electric Code	(from NFPA).			

REFERENCES - 3 - 01 4200

NEMA	National Electrical Manufacturer's Association	Rosslyn	VA	(703) 841-3200	www.nema.org
NFPA	National Fire Protection Association	Quincy	MA	(800) 344-3555	www.nfpa.org
NFRC	National Fenestration Rating Council	Greenbelt	MD	(301) 589-1776	www.nfrc.org
NSF	NSF International	Ann Arbor	MI	(734) 769-8010	www.nsf.org
PCA	Portland Cement Association	Skokie	IL	(847) 966-6200	www.cement.org
PCI	Precast / Prestressed Concrete Institute	Chicago	IL	(312) 786-0300	www.pci.org
PEI	Porcelain Enamel Institute	Norcross	GA	(770) 676-9366	www.porcelainenamel.com
RFCI	Resilient Floor Covering Institute	LaGrange	GA	(706) 882-3833	www.rfci.com
SCTE	Society of Cable Telecommunications Engineers	Exton	PA	(800) 542-5040	www.scte.org
SDI	Steel Deck Institute	Fox River Grove	IL	(847) 458-4647	www.sdi.org
SDI	Steel Door Institute	Westlake	OH	(440) 899-0010	www.steeldoor.org
SIGMA	Sealed Insulating Glass Manufacturer's Association	Chicago	IL	(312) 644-6610	www.arcat.com
SJI	Steel Joist Institute	Myrtle Beach	SC	(843) 293-1995	www.steeljoist.org
SMACNA	Sheet Metal & Air Conditioning Contractors National Association	Chantilly	VA	(703) 803-2980	www.smacna.org
SPIB	Southern Pine Inspection Bureau	Pensacola	FL	(850) 434-2611	www.spib.org
SSMA	Steel Stud Manufacturer's Association	Glen Ellyn	IL	(630) 942-6592	www.ssma.com
TCNA	Tile Council of North America	Anderson	SC	(864) 646-8453	www.tileusa.com
TPI	Truss Plate Institute	Alexandria	VA	(703) 683-1010	www.tpinst.org
TPI	Turfgrass Producers International (formally American Sod Producers Association)	East Dundee	IL	(847) 649-5555	www.turfgrasssod.org
UL	Underwriters Laboratories	Camas	WA	(877) 854-3577	www.ul.com
WDMA	Window and Door Manufacturer's Association	Chicago	IL	(312) 321-6802	www.nwwda.org
WWPA	Western Wood Products Association	Portland	OR	(503) 224-3930	www.wwpa.org

# D. Federal Government Agencies:

1. Names and titles of federal government standard or specification producing agencies are often abbreviated. Following acronyms or abbreviations referenced in Contract Documents represent names of standard or specification producing agencies of federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

CS	Commercial Standard (U S Department of Commerce)	Washington	DC	(202) 512-0000	www.doc.gov
EPA	Environmental Protection Agency	Washington	DC	(202) 272-0167	www.epa.gov
FCC	Federal Communications Commission	Washington	DC	(888) 225-5322	www.fcc.gov
FS	Federal Specifications Unit (Available from GSA)	Washington	DC	(202) 619-8925	www.gsa.gov
MIL	Military Standardization Documents (U S Department of Defense)	Philadelphia	PA	(215) 697-2179	www.dod.gov
NIST	National Institute of Standards and Technology, technology Administration (US Department of Commerce)	Gaithersburg	MD	(301) 975-4500	www.ts.nist.gov
OSHA	Occupational Safety & Health Administration (U S Department of Labor)	Washington	DC	202) 219-8148	www.osha.gov
PS	Product Standard of NBS (U S Department of Commerce)	Washington	DC	(202) 512-1800	www.doc.gov

REFERENCES - 4 - 01 4200

- E. Governing Regulations / Authorities:
  - 1. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
  - 2. Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

REFERENCES - 5 - 01 4200

# SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Related Documents:

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

## B. Related Requirements:

- Section 01 4000: 'Quality Requirements' includes administrative and procedural requirements for quality assurance and quality control.
- 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.

#### 1.2 REFERENCES

#### A. Definitions:

- 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
- 2. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- 3. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
- 4. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.

## B. Reference Standards:

- 1. ASTM International:
  - a. ASTM E329-14a, 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.'

## 1.3 QUALIFICATIONS

- A. Qualifications: Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements:
  - 1. Fabricator / Supplier / Installer Qualifications: Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
    - a. VMR (Value Managed Relationship):
      - 1) Where heading 'VMR (Value Managed Relationship) / Manufacturers / Suppliers / Installers' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project.
      - 2) No other Suppliers / Installers will be acceptable.
      - 3) Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
      - 4) Following areas of the Work have restrictions on sub-bids by Contractor:
        - Accordion Folding Partitions, Section 10 2233: VMR, no other Manufacturer / Installers accepted.
        - b) Aluminum-Framed Entrances And Storefronts, Section 08 4113: VMR, no other Manufacturer / Installers accepted.
        - Architectural Woodwork, Section 06 4001: VMR, no other Fabricator accepted except approved Alternate Fabricator.
        - d) Asphalt Shingles, Section 07 3113: VMR, no other Manufacturer / Installers accepted.

- e) Common Finish Hardware Requirements, Section 08 7101: VMR Supplier, no other Supplier accepted:
  - (1) Accessories, Section 08 7109.
  - (2) Closing Devices, Section 08 7106.
  - (3) Hanging Devices, Section 08 7102.
  - (4) Operating Trim, Section 08 7104.
  - (5) Protective Plates and Trim, Section 08 7107.
  - (6) Securing Devices, Section 08 7103.
  - (7) Stops and Holders, Section 08 7108.
- Flush Wood Doors: Factory Finished, Clear, Section 08 1429: VMR Supplier, no other Supplier accepted.
- g) Hollow Metal Frames, Section 08 1213: VMR Supplier, no other Supplier accepted.
- h) Hollow Metal Doors, Section 08 1313: VMR Supplier, no other Supplier accepted.
- i) Pews, Section 12 6713: VMR, no other Manufacturer / Installers accepted.
- j) Sheet Carpeting, Section 09 6816: VMR, no other Manufacturer / Installers accepted.
- k) Tile Carpeting, Section 09 6813: VMR, no other Manufacturer / Installers accepted.
- I) Wood Athletic Flooring, Section 09 6466: VMR, no other Manufacturer / Installers accepted.
- m) Wood Framing, Division 06 'Wood', VMR Supplier, no other Supplier accepted for USA Projects Only except approved Supplier:
  - (1) Glue-Laminated Construction, Section 06 1800.
  - (2) Structural Composite Lumber, Section 06 1712.
  - (3) Wood Framing, Section 06 1100.
  - (4) Wood 'I' Joists, Section 06 1733.
  - (5) Wood-Panel Product Sheathing, Section 06 1636.

## b. Approved:

- 1) Where heading 'Approved Suppliers / Distributors / Installers / Applicators / Fabricators' is used to identify list of specified suppliers / distributors / installers / applicators / fabricators, use only listed suppliers / installers / fabricators.
- 2) No substitutions will be allowed.
- 3) Following areas of the Work have restrictions on sub-bids by which may be accepted by Contractor:
  - a) Architectural Woodwork, Sections 06 4001: Alternate Fabricator approved by Architect before bidding.
  - b) Audio Systems, Section 27 5117: Alternate Installers approved by Owner before bidding.
  - c) Ceramic Tiling, Section 09 3013: No other Suppliers accepted.
  - d) Electric And Electronic Control System for HVAC, Section 23 0933, No other Distributors accepted.
  - e) Rough Carpentry, Sections 06 1100, 06 1636, 06 1712, 06 1733, and 06 1800: Alternate Supplier approved by Architect before bidding.
  - f) Video Systems, Section 27 4117: Alternate Installers approved by Owner before bidding.
- c. Acceptable Suppliers / Installers:
  - 1) Where heading 'Acceptable Suppliers / Installers / Fabricators' is used, qualifications as specified in Quality Assurance in Part 1 of individual sections will be used to determine requirements of those that will be acceptable to be used on Project. Lists for acceptable installers can include additional installers that may be approved before bidding or by addendum.
  - 2) Following areas of the Work have restrictions on sub-bids by Contractor:
    - a) Baptismal Font Railing, Section 11 9119, Acceptable Installers are listed for each state. Equal Installers to be approved by Architect before installation.
- 2. Factory-Authorized Service Representative Qualifications:
  - a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- 3. Installer Qualifications:
  - a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- 4. Manufacturer Qualifications:
  - a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- 5. Manufacturer's Field Services Qualifications:
  - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.

- 6. Professional Engineer Qualifications:
  - a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- 7. Specialists:
  - a. Certain sections of Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations.
  - b. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.
  - c. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- 8. Testing Agency Qualifications:
  - a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
    - Testing Laboratory:
      - a) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
      - b) Cement and Concrete Reference Laboratory (CCRL).
      - Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
      - d) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

# SECTION 01 4523 TESTING AND INSPECTING SERVICES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes testing, inspections, special testing, special inspections, and testing laboratory services for materials, products, and construction methods as specified hereafter for the Work.
- B. Specified tests, inspections, and related actions do not limit Contractor's quality control procedures to fully comply with Contract Document requirements in all regards.
- C. Costs: Costs of initial services for testing and inspection personnel will be paid by Owner unless otherwise noted.
  - 1. If initial tests indicate non-compliance with contract document requirements, any subsequent testing will be performed by same personnel and paid for by Contractor.

## D. Related Requirements:

- 1. Section 01 4000: 'Quality Requirements' includes administrative and procedural requirements for quality assurance and quality control.
- 2. Section 01 4301: 'Quality Assurance Qualifications' establishes minimum qualification levels required.
- 3. Division 01 through Division 49 establish responsibility for providing specific testing and inspections and Field Tests and Inspections.

## 1.3 REFERENCES

#### A. Association Publications:

- Council of American Structural Engineers. CASE Form 101: Statement of Special Inspections. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15<sup>th</sup> St., NW, Washington, DC 20005; 202-347-7474: www.acec.org).
- 2. International Code Council (IBC):
  - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

## B. Definitions:

- 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
- 2. Approved: To authorize, endorse, validate, confirm, or agree to.
- 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
- 4. Inspection/Special Inspection:
  - a. Inspection: Not required by code provisions but may be required by Contract Documents.
  - b. Special Inspection: Inspection required of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and reference standards (required by code provisions and by Contract Documents).
  - c. Special Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
  - d. Special Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.

- 5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
- 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
- 7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- 8. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
- 9. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
- 10. Special Inspection: See Inspection.
- 11. Special Inspector: Certified individual or firm that implements special inspection program for project.
- 12. Special Test: See Test.
- 13. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship:
  - a. Test: Not required by code provisions but may be required by Contract Documents.
  - b. Special Test: Required by code provisions and by Contract Documents.
- 14. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
- 15. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
- 16. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

#### C. Reference Standards:

- ASTM International:
  - a. ASTM A898/A898M-17, 'Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes'.
  - b. ASTM C42/C42M-16, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
  - c. ASTM C138/C138M-17a, 'Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete'.
  - d. ASTM C597-16, 'Standard Test Method for Pulse Velocity Through Concrete'.
  - e. ASTM C803/C803M-17, 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
  - f. ASTM C805/C805M-13a, 'Standard Test Method for Rebound Number of Hardened Concrete'.
  - g. ASTM C1019-16, 'Standard Test Method for Sampling and Testing Grout'.
  - h. ASTM C1021-08(2014), 'Standard Practice for Laboratories Engaged in Testing of Building Sealants'.
  - i. ASTM C1077-16a, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
  - i. ASTM C1093-15a, 'Standard Practice for Accreditation of Testing Agencies for Masonry.
  - k. ASTM D3666-16, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
  - I. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
  - m. ASTM E114-15, 'Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Examination by the Contact Method'.
  - n. ASTM E164-13, 'Standard Practice for Contact Ultrasonic Testing of Weldments'.
  - o. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
  - p. ASTM E488-15, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
  - q. ASTM E543-15, 'Standard Specification for Agencies Performing Nondestructive Testing'.
  - r. ASTM E587-15, 'Standard Practice for Ultrasonic Angle-Beam Examination by the Contact Method'.
  - s. ASTM E709-15, 'Standard Guide for Magnetic Particle Testing'.
  - t. ASTM E1212-17, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
  - u. ASTM F710-11, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
  - v. ASTM F2170-16b, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
- 2. Code of Federal Regulations:
  - 29 CFR 1910, Subpart A, Section 1910.7, 'Definition and Requirements for a Nationally Recognized Testing Laboratory'.
- 3. International Code Council (IBC 2015 or latest approved edition):
  - a. IBC Chapter 17, 'Special Inspections And Tests'.
    - Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.

- 2) Section 1705, 'Required Special Inspection And Tests'.
  - a) Section 1705.2, 'Steel Construction'.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. General: Additional submittal requirements are specified in Individual Sections in Division 01 through Division 50
  - Certificates:
    - a. Testing Agency will submit certified written report of each inspection, test, or similar service.
  - 3. Tests and Evaluation Reports:
    - a. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies (or electronic record) distributed as follows:
      - 1) 1 copy to Owner's Representative.
      - 2) 1 copy to Architect.
      - 3) 1 copy to Consulting Engineers (Engineer of Record).
      - 4) 1 copy to General Contractor.
      - 5) 1 copy to Authorities Having Jurisdiction (if required).
    - b. Other tests, certificates, and similar documents will be obtained by Contractor and delivered to Owner's Representative and Architect in such time as not to delay progress of the Work or final payment therefore.
    - c. Submittal Format:
      - 1) Schedule of Tests and Inspections: Prepare in tabular form and include following:
        - Specification Section number and title.
        - b) Description of test and inspection.
        - c) Identification of applicable standards.
        - d) Identification of test and inspection methods.
        - e) Number of tests and inspections required.
        - f) Time schedule or time span for tests and inspections.
        - g) Entity responsible for performing tests and inspections.
        - h) Requirements for obtaining samples.
      - 2) Certified written reports of each inspection, test, or similar service will include, but not be limited:
        - a) Date of issue.
        - b) Project title and number.
        - c) Name, address, and telephone number of Testing Agency.
        - d) Dates and locations of samples and tests or inspections.
        - e) Names of individuals making tests and inspections.
        - f) Description of the Work and test and inspection method.
        - g) Identification of product and Specification Section.
        - h) Complete test or inspection data.
        - i) Test and inspection results and an interpretation of test results.
        - Record of temperature and weather conditions at time of sample taking and testing and inspecting.
        - k) Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
        - I) Name and signature of laboratory inspector.
        - m) Recommendations on retesting and re-inspecting.
  - 4. Source Quality Control Submittals:
    - a. Testing Agency will submit following prior to commencing the Work:
      - 1) Qualifications of Testing Agency management and personnel designated to project.
      - 2) Testing Agency 'Written Practice for Quality Assurance'.
      - 3) Qualification records for Inspector and non-destructive testing technicians designated for project.
      - 4) Testing Agency non-destructive testing procedures, equipment calibration records, and personnel training records.
      - 5) Testing Agency Quality Control Plan for monitoring and control of testing operations.
      - 6) Welding Inspection Procedures (Structural Steel testing).
      - 7) Bolting Inspection Procedures (Structural Steel testing).
      - 8) Shear Connector Stud Inspection Procedures (Structural Steel testing).
      - 9) Seismic Connections Inspection Procedures (Structural Steel testing).

## 1.5 QUALITY ASSURANCE

- A. Owner or Owner's designated representative(s) will perform quality assurance. Owner's quality assurance procedures may include observations, inspections, testing, verification, monitoring and any other procedures deemed necessary by Owner to verify compliance with Contract Documents.
- B. Owner will employ independent Testing Agencies to perform certain specified testing, as Owner deems necessary.

## C. Certification:

- 1. Product producers and associations, which have instituted approved systems of quality control and which have been approved by document approval agencies, are not required to have further testing.
- 2. Concrete mixing plants, plants producing fabricated concrete and wood or plywood products certified by agency, lumber, plywood grade marked by approved associates, and materials or equipment bearing underwriters' laboratory labels require no further testing and inspection.

## D. Written Practice for Quality Assurance:

- 1. Testing Agency will maintain written practice for selection and administration of inspection personnel, describing training, experience, and examination requirements for qualification and certification of inspection personnel.
- 2. Written practice will describe testing agency procedures for determining acceptability of structure in accordance with applicable codes, standards, and specifications.
- 3. Written practice will describe Testing Agency inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.

## 1.6 QUALITY CONTROL

- A. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing and inspections, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
- B. Contractor will assign one (1) employee to be responsible for Quality Control. This individual may have other responsibilities and may be Contractor's Project superintendent or Contractor's Project Manager.
- C. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and Owner's Representative within twenty four (24) hours of test or inspection having been performed.
  - 1. Testing and Inspection Reports will be distributed as follows:
    - a. 1 copy to Owner's Representative.
    - b. 1 copy to Architect.
    - c. 1 copy to Consulting Engineer(s) (Engineer of Record).
    - d. 1 copy to Authorities Having Jurisdiction (if required).

## D. Contractor's Responsibility:

- 1. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
- 2. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
- 3. Cooperate with Testing Agency(s) performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify Testing Agency before operations to allow assignment of personnel. Auxiliary services required include but are not limited to:
  - a. Providing access to the Work and furnishing incidental labor, equipment, and facilities deemed necessary by Testing Agency to facilitate inspections and tests at no additional cost to Owner.
  - Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
  - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
  - d. Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
- 4. Contractor will integrate Owner's independent Testing Agency services within Baseline Project Schedule and with other Project activities.
- 5. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.
- 6. All Work is subject to testing and inspection and verification of correct operation prior to 100% payment to Contractor of line item(s) pertaining to that aspect of the Work.

- For Mechanical Equipment, inspection and documented approval of individual equipment and/or system(s) must be accomplished prior to requesting Substantial Completion Inspection for any area affected by said equipment and/or system:
  - a. Contractor will perform thorough checkout of operations with manufacturer's representatives prior to requesting formal inspection by Owner.
  - b. Contractor must notify Owner's Representative, in advance, as to when manufacturer's representative is scheduled to arrive at Site.

## 8. Comply:

- a. Upon completion of Testing Agency's inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
- b. Comply with Contract Documents in making such repairs.
- 9. Data: Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
- 10. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements:
  - a. Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct deficiencies in the Work promptly to avoid Work delays.
  - b. Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.
  - c. Contractor responsible for any and all costs incurred resulting from inspection that was scheduled prematurely or retesting due to failed tests.
  - d. Remove and replace any Work found defective or not complying with contract document requirements at no additional cost to Owner.
  - Should test return unacceptable results, Contractor will bear all costs of retesting and re-inspection as well
    as cost of all material consumed by testing, and replacement of unsatisfactory material and/or
    workmanship.

#### 11. Protection:

- a. Protect construction exposed by or for quality assurance and quality control service activities, and protect repaired construction.
- 12. Scheduling: Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities:
  - a. Schedule testing and inspections in advance so as not to delay the Work and to eliminate any need to uncover Work for testing or inspection.
  - Notify Testing Agency and Architect as noted in Sections in Division 01 through Division 50 prior to any time required for such services.
  - c. Incorporate adequate time for performance of all inspections and correction of noted deficiencies.
  - d. Schedule sequence of activities to accommodate required services with minimum of delay.
  - e. Schedule sequence of activities to avoid necessity of removing and replacing construction to accommodate testing and inspections
- 13. Test and Inspection Log:
  - a. Provide system of tracking all field reports, describing items noted, and resolution of each item. Prepare record of tests and inspections. Include following:
    - 1) Date test or inspection was conducted.
    - 2) Description of the Work tested or inspected.
    - 3) Date test or inspection results were transmitted to Architect.
    - 4) Identification of Testing Agency or inspector conducting test or inspection.
  - b. Maintain log at Project site:
    - 1) Post changes and modifications as they occur.
    - 2) Provide access to test and inspection log for Architect's reference during normal working hours.

#### 1.7 TESTING AND INSPECTIONS - GENERAL

- A. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
- B. Individual Sections in Division 01 through Division 49 indicate if Owner will provide testing and inspection of the Work of that Section.
- C. Tests include but not limited to those described in detail in 'Field Quality Control' in Part 3 of Individual Sections in Divisions 01 through Division 49.

- D. Owner may engage additional consultants for testing, air balancing, or other special services:
  - 1. Activities of any such Owner consultants are in addition to Contractor testing of materials or systems necessary to prove that performance is in compliance with Contract requirements.
  - 2. Contractor must cooperate with persons and firms engaged in these activities.

## E. Taking Specimens:

1. Except as may be specifically otherwise approved by Architect, only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.

## F. Scheduling Testing Agency:

- 1. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
- 2. Contractor will notify Testing Agency and Architect to schedule tests and / or inspections.
- G. For 'building-wide' and/or life safety systems, such as emergency lighting, fire alarm, fire sprinkler systems, etc. formal start-up inspection will be completed prior to requesting Substantial Completion Inspection for any area of Project:
  - Manufacturer's representatives and installing contractor will demonstrate both operation and compliance to
    Owner's agents and consultants. If coordinated and scheduled appropriately by Contractor, these equipment
    and/or systems inspections may also serve to provide required Owner training, if approved in advance by Owner.
  - Contractor responsible for requesting that Architect arrange for inspection of materials, equipment, and work prior to assembly or enclosure that would make materials, equipment, or work inaccessible for inspection and at other times as may be required.

#### 1.8 TESTING AGENCY SERVICES AND RESPONSIBILITIES

- A. Testing Agency, including independent testing laboratories, will be licensed and authorized to operate in jurisdiction in which Project is located.
  - 1. Approved Testing Agency Qualifications: Requirements of Section 01 4301 apply.
- B. Testing and Inspection Services:
  - 1. Testing Agency will not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of the Work.
  - 2. Testing Agency will not give direction or instruction to Contractor.
  - 3. Testing Agency will have full authority to see that the Work is performed in strict accordance with requirements of Contract Documents and directions of Owner's Representative and/or Architect.
  - 4. Testing Agency will not provide additional testing and inspection services beyond scope of Work without prior approval of Owner's Representative and / or Architect.

## C. Testing Agency Duties:

- 1. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
- 2. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
- 3. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
- 4. Testing Agency must have experience and capability to conduct testing and inspecting indicated by ASTM standards and that specializes in types of tests and inspections to be performed.
- 5. Testing Agency will comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and other relevant ASTM standards.
- 6. Testing Agency must calibrate all testing equipment at reasonable intervals (minimum yearly) with accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
- 7. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and will verify compliance with all reference standard requirements.

## D. Testing and Inspection Reports:

- Conduct and interpret tests and inspections and state in each report whether tested and inspected the Work complies with or deviates from requirements.
- 2. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
  - a. Description of method of test.
  - b. Identification of sample and portion of the Work tested.

- 1) Description of location in the Work of sample.
- 2) Time and date when sample was obtained.
- 3) Weather and climatic conditions at time when sample was obtained.
- c. Evaluation of results of tests including recommendations for action.
- 3. Inspection Reports:
  - Testing Agency will furnish 'Inspection at Site' reports for each site visit documenting activities, observations, and inspections.
  - Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
- 4. Reporting Testing and Inspection (Conforming Work):
  - a. Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
- 5. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
  - a. Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
    - Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
    - 2) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
  - b. Prepare non-compliance log to track non-compliant testing or inspections.
- 6. Final Report:
  - Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

## 1.9 ARCHITECT'S RESPONSIBILITIES

- A. Architect Duties:
  - 1. Notify Owner's Representative before each test and/or inspection.

## PART 2 - PRODUCTS Not Used

## PART 3 - EXECUTION

## 3.1 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Field Tests and Inspections requirements are described in 'Field Quality Control' of individual Sections in Division 01 through Division 49.

END OF SECTION

# SECTION 01 4543 FONT WATER ADJUSTING AND BALANCING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Is Not Limited To:
  - 1. Balance and adjust font water system services provided by Owner as described in Contract Documents.

#### B. Related Requirements:

- 1. Section 01 1200: Multiple Contracts Summary: Owner will provide test, balance, and adjust font water systems. PART 3 of this Section establishes requirements for field tests of 'Testing Agency'.
- Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
- 3. Section 01 4301: 'Quality Assurance Qualifications' establishes minimum qualification levels required.
- 4. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 5. Section 01 7800: 'Closeout Submittals'.
- 6. Division 22:
  - a. Completing installation and start-up of plumbing systems, including hot water heater, as required for correct balance.
  - b. Maintaining plumbing system and equipment in full operation during each working day of balancing and adjusting.

## 1.2 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

1. Contractor to assisting Testing Agency in balancing of font water system.

## B. Scheduling:

- 1. Contractor to schedule this work in cooperation with other Sections involved and to comply with completion date for balance and adjust font water system as described in Contract Documents.
- 2. Contact Testing Agency and coordinate (Owner' Representative to provide 'Testing Agency' contact information):
  - a. One inspection when 90% of plumbing system is installed. Coordinate visit with 90% ductwork and equipment inspection.
- 3. Contact Testing Agency and coordinate date(s) for adjusting and balancing work when following is completed (Owner' Representative to provide 'Testing Agency' contact information):
  - a. Potable hot and cold water systems including installation of water heaters, specialties, and devices.
  - Verification of proper water temperature control calibration and setting of control components and correct operation of water heater.
- 4. If, in opinion of Testing Agency, the work is not ready for adjusting and balancing, reschedule as required.

## 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Test and Evaluation Reports:
    - a. Preliminary Report(s):
      - 1) Four copies to be given to Owner's Representative.
    - b. Final Report:
      - 1) Four copies to be given to Owner's Representative.

## B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Record Documentation:
    - 1) Testing and Inspection Reports:

 Testing Agency Testing and Evaluation Final Report of balancing and adjusting font water system. Bind approved copy of Testing and Evaluation Report in Operations And Maintenance Manual for Division 22.

## 1.4 QUALITY ASSURANCE

## A. Qualifications:

- 1. Approved Testing Agency. Section 01 4301 applies, but is not limited to following:
  - a. Testing Agency shall specialize in testing and balancing of hot water heating systems.
  - b. Testing Agency shall provide proof of having successfully completed at least five years of specialized experience in hydronic system balancing.
  - c. Testing Agency shall provide testing under direct supervision of qualified heating and ventilating engineer.
  - d. Neither Architect's engineering consultant nor anyone performing work on this Project under other Sections of Division 22 shall be permitted to do this work.

## PART 2 - PRODUCTS: Not Used

#### PART 3 - EXECUTION

## 3.1 OWNER-FURNISHED TESTING AND INSPECTION

- A. Owner to provide Testing and Inspection for testing, balancing, and adjusting font water systems:
  - See Section 01 1200: Multiple contracts for administrative and procedural requirements for Testing and Inspection services.

## 3.2 PREPARATION

A. Water heater, building plumbing systems, and font water supply and drain systems shall be in full operation and continue in operation during each working day of adjusting and balancing.

#### 3.3 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Font Water System:
    - a. Testing Agency shall provide testing and inspection for Font Water System:
    - b. Site Tests (Purge balance meter using potable water before balancing font water):
      - 1) Balancing And Adjusting Procedure 140 deg F water heater discharge temperature):
        - a) Open main font water supply valve. Set hot water balancing device first. Set device for three gpm flow. Set cold water balancing device so temperature gauge reads 100 deg F. Close main supply valve.
        - b) Verify settings by opening font supply valve and checking temperature gauge reading and hot water balancing device setting. Adjust as required. Close font supply valve.
      - 2) Balancing And Adjusting Procedure: 110 deg F water heater discharge temperature):
        - a) Open main font water supply valve. Set hot water balancing device first. Set device to full open. Set cold water balancing device so temperature gauge reads 100 deg F. Close main supply valve.
        - b) Verify settings by opening font supply valve and checking temperature gauge reading and hot water balancing device setting. Adjust as required. Close font supply valve.

# 3.4 CLOSEOUT ACTIVITIES

A. Post copy of appropriate 'Balancing And Adjusting Procedure' inside Font Valve Box cover.

END OF SECTION

## SECTION 01 4546 DUCT TESTING, ADJUSTING, AND BALANCING

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Is Not Limited To:
  - 1. Test, balance, and adjust air duct systems services provided by Owner as described in Contract Documents.

## B. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary': Owner will provide test, balance, and adjust air duct systems. PART 3 of this Section establishes requirements for field tests of 'Testing Agency'.
- Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
- 3. Section 01 4301: 'Quality Assurance Qualifications' establishes minimum qualification levels required.
- 4. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 5. Section 01 7800: 'Closeout Submittals'.
- 6. Division 23:
  - a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
  - b. Maintain HVAC system and equipment in full operation each working day of testing, balancing, and adjusting.

## 1.2 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

1. Contractor to assist Testing Agency in testing and balancing of mechanical system.

## B. Scheduling:

- 1. Contractor to schedule this work in cooperation with other Sections involved and to comply with completion date for test, balance, and adjust air duct systems as described in Contract Documents.
- 2. Contact Testing Agency and coordinate (Owner' Representative to provide 'Testing Agency' contact information):
  - a. One inspection when 60 percent of ductwork is installed.
  - b. One inspection when 90 percent of equipment and ductwork is installed.
- 3. Contact Testing Agency and coordinate date(s) for test and balance work when following is completed:
  - a. HVAC and exhaust systems including installation of specialties, devices, and new filters.
  - b. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
  - c. Automatic temperature controls have been calibrated and set for design operating conditions.
  - d. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.
- 4. If, in opinion of Testing Agency, systems are not ready for test and balance, reschedule as required.

## 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Test and Evaluation Reports:
    - a. Preliminary Report(s):
      - 1) Four copies to be given to Owner's Representative.
    - b. Final Report
      - 1) Four copies to be given to Owner's Representative.

## B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Record Documentation:

- 1) Testing and Inspection Reports:
  - a) Testing Agency Testing and Evaluation Final Report of testing, balancing, and adjusting air duct systems. Bind approved copy of Testing and Evaluation Report in Operations And Maintenance Manual for Division 23.

## 1.4 QUALITY ASSURANCE

#### A. Qualifications:

- 1. Approved Testing Agency. Section 01 4301 applies, but is not limited to following:
  - a. Testing Agency shall specialize in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
  - b. Testing Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing.
  - c. Testing Agency shall provide testing under direct supervision of qualified heating and ventilating engineer.
  - d. Neither Architect's engineering consultant nor anyone performing work on this Project under other Sections of Division 23 shall be permitted to do this work.

## PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

#### 3.1 OWNER-FURNISHED TESTING AND INSPECTION

- A. Owner to provide Testing and Inspection for testing, balancing, and adjusting air duct systems:
  - See Section 01 1200: Multiple contracts for administrative and procedural requirements for Testing and Inspection services.

## 3.2 FIELD QUALITY CONTROL

#### A. Field Tests

- 1. Air System Testing, Adjusting, And Balance:
  - a. Inspections and site visits. (For paragraph a thru c, note deficiencies, if any, that needs to be corrected and report this to Owner's Representative, Architect, and Mechanical Engineer):
    - 1) One inspection when ductwork installation is 60% complete.
    - 2) One inspection when ductwork is installation is 90% complete.
    - 3) One inspection when potable hot and cold water system is 90% complete.
    - 4) Site visit for test and balance. Before commencing test and balance, perform an inspection to verify 100% completion of system. Confirm completion of work, correction of previously noted deficiencies, and look for new deficiencies not noted in previous inspections. If the work is complete, then proceed with test and balance. If the work is not complete and ready for test and balance, inform Contractor and submit an invoice to Owner's Representative for compensation for travel time, expenses, and time on site. Report deficiencies or incomplete work to Owner's Representative, Architect, and Mechanical Engineer.
    - 5) Additional site visits (beyond those set forth above) to complete the work after issues are resolved may be needed and will be paid for separately from compensation for services set forth in this Agreement, pursuant to hourly rates and conditions set forth in Attachment "A".
  - b. Checklist for Inspections and site visits:
    - Pre-Startup Inspection use for inspections and site visits a thru d in paragraph 1 above. All
      pertinent items shall be checked, including but not limited to following:
      - a) Removal of shipping blocks and stops.
      - b) Vibration isolators' alignment and adjustment.
      - c) Flexible connections properly installed and aligned.
      - d) Safety controls, high or low limits in operation.
      - e) Filters in place and seal provided around edges.
      - f) Filters and strainers are clean.
      - g) Installation of all gauges on equipment.
      - h) Control system is operating.

- i) All dampers, valves, and operators are properly installed and operating.
- j) All ductwork is installed and sealed.
- k) Voltage to unit matches nameplate voltage.
- 2) First Run Inspection use for inspections and site visits d and e in paragraph 1 above. Recheck items in Pre-Startup list, and check for following items:
  - a) Excessive vibration or noise.
  - b) Loose components.
  - c) Initial control settings.
  - d) Motor amperages.
  - e) Heat buildup in motors.
  - f) Control system is calibrated and functioning as required.
- 3) System Operation Inspection use for inspections and site visits d and e in paragraph 1 above. Observe mechanical systems under operation for sufficient amount of time to ensure proper operation in all running modes. Check following items periodically.
  - a) Filters.
  - b) Check for system leaks.
- c. Performance Requirements:
  - 1) Testing and balancing in complete accordance with Associated Air Balance Council (AABC) Standards for Field Measurement & Instructions, Form P1266, Volume I.
  - 2) Noise level in chapel and / or cultural hall shall not exceed NC 35 with all HVAC equipment operating in full or second stage cooling mode.
- d. Site tests: Air Test and Balancing Procedure:
  - 1) Instruments used by Consultant shall be accurately calibrated and maintained in good working order.
  - 2) All supply air and return air fans in all HVAC zone systems, energy recovery ventilators, and exhaust fans in building shall be operating when final setup of all units is performed.
  - 3) Perform tests at high and low speeds of multi-speed systems and single speed systems.
  - 4) Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards.
    - a) Fan Speeds Furnaces (with direct drive motors): Set fan speed to lowest possible setting that will achieve design CFM requirements. Adjust down from Contractor setting, if necessary. Adjust low voltage fan speed jumpers (provided and installed by installing contractor) as necessary to achieve design cooling air flow at lowest possible setting. An exception to this would be when furnace is variable speed blower for dehumidification applications.
    - b) Current And Voltage: Measure and record motor current and voltage.
    - c) Pitot-Tube Traverse Method:
      - (1) Make measurements in duct where velocity is uniform, 7-1/2 duct diameters downstream and 2 duct diameters minimum upstream from any turbulence, i.e., elbow, damper, take-off, etc.
      - (2) Perform pitot-tube traverse of outdoor ventilation air duct serving each piece of air moving equipment.
      - (3) Where single outdoor ventilation air trunk duct serves multiple pieces of equipment, perform pitot-tube traverse of duct branch serving each piece of equipment as well as pitot-tube traverse of total air flow in trunk with all pieces of equipment operating.
    - d) Where pitot-tube traverse is not possible or if pitot-tube traverse is unreliable, flow hood measurement over exterior intake louver or grille is acceptable for measuring outdoor ventilation air
    - e) Use proportionate method of air balance leaving fan at lowest possible speed and at least one branch balance damper fully open.
  - 5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
  - 6) Air Temperature: Take dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
  - 7) Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
  - 8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
  - 9) Tolerances: Test and balance all fans, zone ducts, registers, diffusers etc. to + or 10 percent of design CFM.
  - 10) Identification: Identify location and area of each grille, diffuser, register, and terminal box. Record on air outlet data sheets.
  - 11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.

- 12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts. For high sidewall supply air diffusers install horizontal blade core to direct air flow upward 15 degree and set adjustable vertical blades to spread air flow horizontally and evenly in fan pattern.
- 13) Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
- 14) Smoke testing: Smoke testing, or some other approved means, may be required to determine leak locations if air balance report indicates that any system's CFM total is less than 90 percent of design CFM. Prior to test, verify that system's duct joints have been sealed as specified and that air moving device in question is supplying required design system air flow. Mechanical Engineer will approve test method required. If smoke test is selected, use following procedure. Provide necessary precautions to protect those performing or observing test from being exposed to smoke.
  - Use zinc chloride smoke candles, titanium tetrachloride ampules or sticks, or other devices acceptable to Mechanical engineer to generate smoke.
  - b) Close openings in duct except for one opening at farthest end of duct run.
  - c) Circulate smoke at pressurized condition of 1/2 inch minimum water gauge static pressure.
  - d) Report findings to mechanical engineer in writing.
- e. Air System Test and Evaluation Report:
  - 1) Record test data on AABC standard forms or facsimile.
  - Preliminary Report: Provide and deliver four copies of complete data for evaluation and approval to Owner.
  - 3) Final report: Provide and deliver complete four copies of final report to Owner prior to project Substantial Completion date.
  - 4) Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
  - 5) Certified accurate and complete by Consultant's certified test and balance engineer.
  - 6) Contain following general data in format selected by Consultant:
    - a) Project Number.
    - b) Project Title.
    - c) Project Location.
    - d) Project Architect and Mechanical Engineer.
    - e) Consultant and Certified Engineer.
    - f) Contractor and mechanical sub-contractor.
    - g) Dates tests were performed.
    - h) Certification Document.
    - i) Report Forms similar to AABC Standard format.
  - 7) Report shall include following:
    - a) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
    - b) HVAC zone identification to include reduced ductwork floor plan from project documents with outlets and inlets numbered to match written test and balance report. This page may be oversized but it should fold up neatly within standard 81/2 x 11 report paper size.
    - c) Record following for each piece of air handling equipment:
      - (1) Manufacturer, model number, and serial number.
      - (2) Design and manufacture rated data.
      - (3) Actual CFM.
      - (4) Suction and discharge static pressure of each fan.
      - (5) Outdoor-ventilation-air and return-air total CFM.
      - (6) Final RPM of each motor or speed tap.
      - (7) Actual operating current and voltage of each fan motor.

## 3.3 PREPARATION

A. Heating, ventilating, and cooling systems and equipment shall be in full operation and continue in operation during each working day of testing and balancing.

## END OF SECTION

# SECTION 01 5100 TEMPORARY UTILITIES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Temporary Utilities.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.
  - 1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
  - 2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
  - 3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
  - 4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
  - 5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
  - 6. Use qualified personnel for installation and maintenance of temporary facilities. Locate temporary utilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify temporary utilities as required.
  - Pay cost and use charges for temporary and permanent utilities until Substantial Completion has been granted by Owner.
- B. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, change over from use of temporary service to use of permanent service.
- C. Keep temporary utilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload utilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- D. Limit availability of temporary utilities to essential and intended uses to reduce waste and abuse.
- E. Maintain temporary utilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
  - Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- F. Remove each temporary utility and control when need has ended, or when replaced by permanent utility, but not later than Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary utility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that make up temporary utilities are property of Contractor.
  - 2. By Substantial Completion, clean and renovate permanent utilities used during construction period, including but not limited to:
    - a. Replace air filters and clean inside of ductwork and housings.
    - b. Replace significantly worn parts and parts subjected to unusual operating conditions.
    - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

TEMPORARY UTILITIES - 1 - 01 5100

### 1.3 TEMPORARY ELECTRIC POWER

A. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

### 1.4 TEMPORARY FIRE PROTECTION

- A. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher.
  - 2. Store combustible materials in containers in fire-safe locations.
  - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
  - 4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
  - 5. At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

# 1.5 HEATING, COOLING, AND VENTILATING:

- A. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary to provide environmental conditions specified for various portions of the Work. Coordinate ventilation requirements to produce ambient conditions required and reduce consumption of energy.
- B. Repair damage to building and contents caused by cold, heat, dampness, and/or heating, cooling, and ventilating equipment. Select equipment that will not have harmful effect on completed installations or on elements being installed.
- C. Maintain safe conditions for use of temporary heating, cooling, and ventilating systems including, but not limited to, following requirements:
  - 1. Operate equipment according to equipment manufacturer's instructions.
  - 2. Provide fresh air ventilation required by equipment manufacturer.
  - 3. Keep temperature of fuel containers stabilized.
  - 4. Secure fuel containers from overturning.
  - 5. Operate equipment away from combustible materials.
- D. Permanent mechanical system may be operated subject to following conditions:
  - 1. Do not operate system when work causing air-borne dust is occurring or when dust caused by such work is present without installation of temporary filtering system approved by Architect.
  - 2. Operate system at no cost to Owner, including cost of fuel.
  - 3. Assume all responsibility and risk for operation of system.
  - 4. Return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

### 1.6 TEMPORARY LIGHTING

A. Install and operate temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

### 1.7 TEMPORARY TELEPHONES

- A. Provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.
- B. Contractor will pay for Local calls. Party making call will pay for long-distance and toll calls.

TEMPORARY UTILITIES - 2 - 01 5100

C. At each telephone, post list of important telephone numbers.

# 1.8 TEMPORARY WATER SERVICE

A. Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

TEMPORARY UTILITIES - 3 - 01 5100

# SECTION 01 5200 CONSTRUCTION FACILITIES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Construction Facilities.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Prepare schedule indicating dates for implementation and termination of each temporary facility.
- B. Keep temporary facilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- C. Maintain facilities in good operating condition until removal.
- D. Remove each temporary facility when need has ended, or when replaced by authorized use of permanent facility, or by Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that make up temporary facilities are property of Contractor.
  - 2. By Substantial Completion, clean and renovate permanent facilities used during construction period.

## 1.3 FIELD OFFICES

- A. Provide and maintain insulated, weather tight temporary office of sufficient size to accommodate Contractor's personnel at Project site and for use by Owner, Architect and Subcontractors.
  - 1. Keep office clean and orderly.
  - 2. Heat and cool office as needed.
  - 3. Furnish office with locking door, light(s), table(s), bench(es), rack(s) for drawings, telephone, and FAX machine.
  - 4. Make office available for progress meetings.
  - 5. Provide an operable fire extinguisher in facility.
  - 6. Provide hardhats for Owner's Representatives for site visits.
- B. If Owner agrees to permit removal of temporary office before Substantial Completion, Contractor may use a room as an office after temporary office is removed. Equip room as specified above and restore to 'like-new' condition before Substantial Completion.

### 1.4 SANITARY FACILITIES

A. Provide temporary sanitary toilet. Service and maintain temporary toilet in a clean, sanitary condition.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SECTION 01 5400 CONSTRUCTION AIDS

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Construction Aids.

# 1.2 SCAFFOLDING, PLATFORMS, STAIRS, ETC

- A. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, and elevators as required for proper execution of The Work.
- B. Apparatus, equipment, and construction shall meet requirements of applicable laws and safety regulations.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

CONSTRUCTION AIDS - 1 - 01 5400

# SECTION 01 5600 TEMPORARY BARRIERS AND ENCLOSURES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Temporary Barriers and Enclosures.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Protection Of Existing Improvements: Protect streets, private roads, and sidewalks, including overhead protection where required. Repair damage to existing improvements caused by construction activities.
- B. Protection Of Adjacent Property: Provide necessary protection for adjacent property and lateral support thereof.
- C. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:
  - 1. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.
  - 2. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
  - Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
  - 4. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
  - 5. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.

### 1.3 TEMPORARY BARRICADES

- A. Comply with standards and code requirements in erecting barricades, warning signs, and lights.
- B. Take necessary precautions to protect persons, including members of the public, from injury or harm.

### 1.4 TEMPORARY FENCING

A. Before construction begins, install 6 foot high enclosure fence with lockable entrance gates. Locate where shown on Drawings. If not shown on Drawings, enclose entire site or portion sufficient to accommodate construction operations.

### 1.5 TEMPORARY SECURITY BARRIERS

- A. Install temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and other violations of security.
- B. Secure materials and equipment stored on site.

- C. Secure building at the end of each work day.
- D. Maintain exterior building security until Substantial Completion.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SECTION 01 5700 TEMPORARY CONTROLS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Temporary Controls.

### 1.2 TEMPORARY EROSION AND SEDIMENT CONTROL

- A. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
- B. Develop, install, and maintain an erosion control plan as required by law.
- C. Repair and correct damage caused by erosion.

### 1.3 TEMPORARY ENVIRONMENTAL CONTROLS

- A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
  - 1. Avoid use of tools and equipment that produce harmful noise.
  - 2. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.
- B. Provide protection against weather (rain, winds, storms, frost, or heat) to maintain all work, materials, apparatus, and fixtures free from injury or damage.
- C. Protect excavation, trenches, and building from damage from rain water, spring water, ground water, backing up of drains or sewers, and all other water:
  - 1. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, use permanent facilities.
  - 2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
- D. Comply with governing ordinances relating to weed control and removal.

### PART 2 - PRODUCTS Not Used

### PART 3 - EXECUTION Not Used

# SECTION 01 5800 PROJECT IDENTIFICATION

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Project Identification.

### 1.2 TEMPORARY PROJECT SIGNAGE

- A. Contractor may, at its option, erect a temporary project identification sign.
  - 1. Sign may be free-standing or attached to temporary field office or storage shed.
  - 2. No other signs or advertisements are allowed on building site.
  - 3. Sign will be no larger than 4 feet by 8 feet and include following information:
    - a. Project Name as shown in Contract Documents.
    - b. Contractor's name.
    - c. Architectural firm name.
  - 4. Owner reserves the right to remove and/or take possession of any project identification sign.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SECTION 01 6100 COMMON PRODUCT REQUIREMENTS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Common Product Requirements.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Provide products that comply with Contract Documents, that are undamaged, and, unless otherwise indicated, new and unused at time of installation. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
- B. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on building exterior.
  - 1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
  - 2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate will contain following information and other essential operating data:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.
- C. Where specifications describe a product or assembly by specifying exact characteristics required, with or without use of brand or trade name, provide product or assembly that provides specified characteristics and otherwise complies with Contract requirements.
- D. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.
- E. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.
- F. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.
- G. Where specified product requirements include phrase `... as selected from manufacturer's standard colors, patterns, textures...' or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.
- H. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.
- I. Informational Submittals:
  - 1. Sustainable Design Submittals:
    - a. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.

b. Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SECTION 01 6200 PRODUCT OPTIONS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Product Options.

### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Product Selection:
  - 1. When option of selecting between two or more products is given, product selected will be compatible with products previously selected, even if previously selected products were also options.
- B. Non-Conforming Work:
  - Non-conforming work as covered in Article 12.3 of General Conditions applies, but is not limited, to use of nonspecified products or manufacturers.
- C. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
  - Substitutions And Equal Products:
    - a. Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
    - b. Approved Products / Manufacturers / Suppliers / Installers:
      - 1) Category One:
        - a) Owner has established 'Value Managed Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
      - 2) Category Two:
        - a) Owner has established National Contracts that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
      - 3) Category Three:
        - Specified products are provided to Church Projects under a National Account Program. Use these products to preserve advantages that accrue to Owner from those programs. No substitutions or equal products will be allowed on this Project.
      - 4) Category Four:
        - a) Provide only specified products available from manufacturers listed. No substitutions, privatelabeled, or equal products, or mixing of manufacturers' products is allowed on this Project.
        - b) In Sections where lists recapitulating Manufacturers previously mentioned in Section are included under heading 'Manufacturers' or 'Approved Manufacturers', this is intended as a convenience to Contractor as a listing of contact information only. It is not intended that all manufacturers in list may provide products where specific products and manufacturers are listed elsewhere in Section.
    - c. Acceptable Products / Manufacturers / Suppliers / Installers:
      - 1) Type One: Use specified products / manufacturers unless approval to use other products / manufacturers has been obtained from Architect by Addendum.
      - Type Two: Use specified products / manufacturers unless approval to use other products and manufacturers has been obtained from Architect in writing before installing or applying unlisted or private-labeled products.
      - 3) Use 'Equal Product Approval Request Form' to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.

- d. Quality / Performance Standard Products / Manufacturers:
  - 1) Class One: Use specified product / manufacturer or equal product from specified manufacturers only.
  - Class Two: Use specified product / manufacturer or equal product from any manufacturer.
  - 3) Products / manufacturers used shall conform to Contract Document requirements.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

PRODUCT OPTIONS - 2 - 01 6200

# SECTION 01 6400 OWNER - FURNISHED PRODUCTS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Administrative and procedural requirements for Owner-Furnished Products. Install items furnished by Owner or receive and store in safe condition items purchased directly by Owner according to requirements of Contract Documents:
  - 1. Windows. See Section 08 5313.
  - 2. Baby Changing Station. See Section 10 2814.
  - 3. Display Cases. See Section 10 1200.
  - 4. Fixed Chalkboards. See Section 10 1113.
  - 5. Fixed Markerboards. See Section 10 1116.
  - 6. Fixed Tackboards. See Section 10 1123.
  - 7. Interior Signage. See Section 10 1495.
  - 8. Network Equipment. See Section 27 1501:
    - a. Internet Firewall.
    - b. ISP Modem.
    - c. Network Switch.
    - d. Wireless Access Port.
  - 9. Network Streaming Equipment: See Section 27 4117 and Section 27 5117.
  - 10. Projection Screens. See Section 11 5213.
  - 11. Scoreboards. See Section 11 6643.
  - 12. Serving Area Appliances. See Section 11 3114.
  - 13. Wall Padding. See Section 11 6626 for safety wainscot.
  - 14. Volleyball Equipment As specified in Section 11 6625:
    - a. Volleyball floor sleeves (anchors) installed concrete slab by Section 03 3111.
    - b. Volleyball upright (standard) storage unit installed by Section 06 2001.
    - c. Volleyball cover plates and outer rings install by floor installer (Division 09).

### 1.2 ADMINISTRATIVE REQUIREMENTS

### A. General:

- 1. Review 'Contractor Notice of Owner Furnished Materials' notice listing Owner-furnished products to be delivered for Project:
  - a. Review due (delivery) dates and vendor lead times for each item and coordinate with construction schedule. Immediately report recommended changes to Owner's Purchasing Coordinator listed in 'Contractor Notice of Owner Furnished Materials'. Contact vendors directly if changes to delivery dates become necessary during construction.
  - b. Report problems in coordinating due (delivery) dates with construction schedule to Architect and Owner's Purchasing Coordinator.
- 2. Receive unload, store and protect Owner-furnished materials and products.
  - a. Provide labor and equipment necessary to receive, unload, and store materials and products.
  - count number of pieces received and note any discrepancies on Delivery Receipt before driver leaves:
    - 1) Compare 'Contractor Notice of Owner Furnished Materials' notice' with packing slips.
    - 2) Note discrepancies in number, size, color, model numbers, etc. on Delivery Receipt.
  - c. Include Project Name and Project Number on Delivery Receipt.
  - d. Check for visible evidence of damage such as holes, tears, or crushed portions of cartons and note on Delivery Receipt before driver leaves:
    - 1) Include Project Name and Project Number on Delivery Receipt.
    - 2) If you are unsure if carton is damaged, take photo of cartons and share it with Owner's Purchasing Coordinator.
  - e. Properly store and protect all deliveries of Owner Furnished materials and Products.

- 3. Within forty-eight (48) hours of delivery:
  - a. Open and inspect each piece of freight delivered. Take picture of any concealed damage not reported at time of delivery and report it to Owner's Purchasing Coordinator.
  - b. Compare 'Contractor Notice of Owner Furnished Materials' with packing slips. Note discrepancies in number, size, color, model numbers, etc.
  - c. Deliver copy of Delivery Receipt (bill of lading) on which you have noted any loss or damage to Owner's Purchasing Coordinator. Include in your submission any report of concealed damage, discrepancies or photos.
- 4. Failure to strictly follow above procedures will result in your assumption of all financial responsibility for this shipment. All replacement and reorders must be made through Owner's Purchasing Coordinator and must allow Owner's vendor sufficient lead time to produce and ship new product.
- When above procedures are strictly followed, shortages and damaged items will be replaced by Owner at Owner's cost.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# **SECTION 01 6600** PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Product Delivery, Storage, and Handling Requirements.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

#### 1.3 **DELIVERY AND ACCEPTANCE REQUIREMENTS**

- Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.
- В. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

#### 1.4 STORAGE AND HANDLING REQUIREMENTS

- Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
- В. Store heavy materials away from Project structure so supporting construction will not be endangered.
- Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SECTION 01 7300 EXECUTION

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for governing Execution of the Work.

### 1.2 COMMON INSTALLATION PROVISIONS

- A. Manufacturer's Instructions: Comply with Manufacturer's installation instructions and recommendations to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents. Notify Architect of conflicts between Manufacturer's installation instructions and Contract Document requirements.
- B. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Anchor each product securely in place, accurately located, and aligned with other Work. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain best visual effect. Refer questionable choices to Architect for final decision.
- D. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- E. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.
- F. Mounting Heights: Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

EXECUTION - 1 - 01 7300

# SECTION 01 7400 CLEANING AND WASTE MANAGEMENT

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Administrative and procedural requirements for Cleaning and Waste Management as described in Contract Documents
- B. Related Requirements:
  - 1. Section 01 1200: Coordination of responsibilities for waste management.
  - 2. Section 01 6400: Waste removal of Owner furnished products.
  - 3. In addition to standards described in this section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

### 1.2 REFERENCES

### A. Definitions:

- 1. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waster or debris.
- 2. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- 3. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- 4. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- 5. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- 6. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- 7. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

# PART 2 - PRODUCTS: Not Used

### PART 3 - EXECUTION

### 3.1 PROGRESS CLEANING

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
- B. Keep premises broom clean during progress of the Work.
- C. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.
- D. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
- E. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
- F. Organ Chamber:
  - 1. Clean debris from inside Organ Chamber and leave dust free before organ speakers are installed.
- G. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

- H. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- I. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.
- J. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.
- K. Construction Waste Management And Disposal:
  - 1. Remove waste materials and rubbish caused by employees, Subcontractors, and contractors under separate contract with Owner and dispose of legally. Remove unsuitable or damaged materials and debris from building and from property.
    - a. Provide adequate waste receptacles and dispose of materials when full.
    - b. Properly store volatile waste and remove daily.
    - Do not deposit waste into storm drains, sanitary sewers, streams, or waterways. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
  - 2. Do not burn waste materials or build fires on site. Do not bury debris or excess materials on Owner's property.

### 3.2 FINAL CLEANING

- A. Immediately before Substantial Completion, thoroughly clean building and area where The Work was performed. Remove all rubbish from under and about building, landscaped areas and parking lot and leave building and Project Site ready for occupancy by Owner.
- B. Comply with individual manufacturer's cleaning instructions.
- C. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program, including but not limited to:
  - 1. Interior Cleaning:
    - a. Clean inside glazing, exercising care not to scratch glass.
    - b. Remove marks, stains, fingerprints and dirt.
    - c. Clean and polish woodwork and finish hardware.
    - d. Remove labels that are not permanent labels.
    - e. Clean plumbing fixtures and tile work. Remove spots, soil or paint.
    - f. Clean surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
    - g. Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
    - h. Remove temporary floor protection and clean floors.
  - 2. Exterior Cleaning:
    - a. Clean outside glazing, exercising care not to scratch glass.
    - b. Remove marks, stains, and dirt from exterior surfaces.
    - c. Clean and polish finish hardware.
    - d. Remove temporary protection systems.
    - e. Clean dirt, mud, and other foreign material from paving, sidewalks, and gutters.
    - f. Clean drop inlets, through-curb drains, and other drainage structures.
    - g. Remove trash, debris, and foreign material from landscaped areas.

# SECTION 01 7700 CLOSEOUT PROCEDURES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Procedures.

### 1.2 GENERAL

- A. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
- B. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.
- C. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect and included on Certificate of Substantial Completion.

# 1.3 PRELIMINARY CLOSEOUT REVIEW

- A. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
- B. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
- C. Architect and his appropriate consultants, together with Contractor and mechanical, plumbing, fire protection, and electrical sub-contractors shall conduct a space by space and exterior inspection to review materials and workmanship and to demonstrate that systems and equipment are operational.
  - 1. Punch list of items requiring completion and correction will be created.
  - 2. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.

### 1.4 SUBSTANTIAL COMPLETION INSPECTION

- A. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
- B. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
- C. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
  - 1. Date of Substantial Completion.
  - 2. Punch List Work not yet completed, including seasonal and long lead items.
  - 3. Amount to be withheld for completion of Punch List Work.
  - 4. Time period for completion of Punch List Work.
  - 5. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.

D. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

# 1.5 FINAL ACCEPTANCE MEETING

- A. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.
- B. Owner, Architect and Contractor execute Owner's Project Closeout Final Acceptance form, and verify:
  - 1. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
  - Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
  - 3. Final cleaning requirements have been completed.
- C. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout Final Acceptance form.
- D. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

**END OF SECTION** 

CLOSEOUT PROCEDURES - 2 - 01 7700

# SECTION 01 7800 CLOSEOUT SUBMITTALS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Submittals.
- B. Related Requirements:
  - Section 01 3300: 'Submittal Procedures' for administrative and procedural requirements for submittal procedures.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Project Record Documents:
  - 1. Do not use record documents for construction purposes:
    - a. Protect from deterioration and loss in secure, fire-resistive location.
    - b. Provide access to record documents for Architect's reference during normal working hours.
  - 2. Maintain clean, undamaged set of Drawings:
    - a. Mark set to show actual installation where installation varies from the Work as originally shown.
    - b. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
    - c. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
    - d. Mark new information that is important to Owner, but was not shown on Drawings.
    - e. Note related Change Order numbers where applicable.

## B. As Built Record Drawings:

- 1. As required in agreement with the Owner:
  - a. Architect will provide two full-size sets of prints of the As Built Record Drawings to the Facilities Management Office, printed from the updated AutoCAD drawing files or updated Revit model files, as specified by Owner, that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner.
  - b. Architect will submit following:
    - 1) Updated AutoCAD as built record drawing files with associated plot style tables.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operations And Maintenance Manual:
  - 1. General:
    - a. Include closeout submittal documentation as required by Contract Documentation.
    - b. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
    - c. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
    - d. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
    - e. Submittal Format:
      - Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
      - Include only closeout submittals as defined in individual specification section as required in Contract Documents.
  - Project Manual:
    - a. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:

- Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
- 2) Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
- 3. Maintenance Contracts:
  - a. Digital format only.
- 4. Operations and Maintenance Data:
  - a. Digital format only:
    - 1) Cleaning instructions.
    - 2) Maintenance instructions.
    - 3) Operations instructions.
    - 4) Equipment list.
    - 5) Parts list.
- 5. Warranty Documentation:
  - a. Digital format of final, executed warranties.
- 6. Record Documentation:
  - a. Digital format only.
    - 1) Certifications.
    - 2) Color and pattern selections.
    - 3) Design Data.
    - 4) Geotechnical Evaluation Reports (soils reports).
    - 5) Manufacture Reports.
    - 6) Manufacturer's literature or cut sheets.
    - 7) Shop Drawings.
    - 8) Source Quality Control.
    - 9) Special Procedures.
    - 10) Testing and Inspection Agency Reports.
    - 11) Testing and Inspection Reports.
- 7. Software:
  - a. Audio and Video System software, programming and set-files.
- 8. Irrigation Plan.
  - a. Laminated and un-laminated reduced sized hard copies.
- 9. Landscape Management Plan (LMP):
  - a. Irrigation Section:
    - 1) Submittal Format: Digital format and hard copy of each.
    - 2) Documentation required by sections under 32 8000 Heading: 'Irrigation'.
  - b. Landscaping Section:
    - 1) Submittal Format: Digital format and hard copy of each.
    - 2) Documentation required by sections under 32 9000 Heading: 'Planting'.

# 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Submit item(s) required by Section 01 3300 'Submittal Procedures' and as defined in individual specification section if required in Contract Documents. Items may be provided at completion of Work or with Closeout Submittals.

### 1.5 WARRANTIES

- A. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
- B. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# **DIVISION 3 - CONCRETE:**

DIVISION 3 -	CONCRETE:
03 1000	Concrete Forming and Accessories
03 1113	Structural Cast-In-Place Concrete Forming
03 1511	Concrete Anchors
03 1513	Waterstops
03 2000	Concrete Reinforcing
03 2100	Reinforcement Bars
03 3000	Cast-In-Place Concrete
03 3111	Cast-In-Place Structural Concrete
03 3923	Membrane Concrete Curing
03 4000	Precast Concrete
03 4800	Precast Concrete Specialties
03 6000	Grouting
03 6213	Non-Metallic Non-Shrink Grout

DIVISION 03 CONCRETE

# SECTION 03 1113 STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Design, construction, and safety of formwork.
  - 2. Furnish and install required formwork ready for placing of concrete.
  - 3. Strip and dispose of formwork.
- B. Related Requirements:
  - 1. Section 03 1513: 'Waterstops'.
  - 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
    - a. Tolerances for placing structural concrete.
    - b. Pre-installation conference held jointly with other concrete related sections.
  - 3. Section 32 3213: Cast-In-Place Concrete Retaining Walls'.

### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American Concrete Institute:
    - a. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.

### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Printed application instructions for form release agents.

### PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Forms: Wood, metal, or plastic as arranged by Contractor:
  - 1. Forming material shall be compatible with specified form release agents and with finish requirements for concrete to be left exposed or to receive a smooth rubbed finish.

### 2.2 ACCESSORIES

- A. Form Release Agents:
  - 1. Unexposed Surfaces Only: Contractor's option.
- B. Form Release / Finish Agent:
  - 1. Vertical, Exposed Surfaces or Unexposed Surfaces:

- a. Chemically acting type.
- b. Type Two Acceptable Products.
  - 1) Crete-Lease 727 or 20-VOC by Cresset Chemical Co, Weston, OH www.cresset.com.
  - Clean Strip (J-1 or J-3 VOC) by Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
  - 3) E-Z Strip or DEBOND Form Coating by L & M Construction Chemicals, Omaha, NE www.lmcc.com.
  - 4) Q-2 by Unitex, Kansas City, MO www.unitex-chemicals.com.
  - 5) U S Spec SlicKote by U S Mix Products Co www.usspec.com.
  - 6) Duogard or Duogard II by W R Meadows, Elgin, IL www.wrmeadows.com.
  - 7) Equal as approved by Architect before use. See Section 01 6200.

### C. Expansion / Contraction Joints:

- 1. 1/2 inch (13 mm thick.
- 2. Manufactured commercial fiber type:
  - a. Meet requirements of ASTM D1751.
  - b. Type Two Acceptable Products:
    - 1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.
    - 2) Sealtight by W R Meadows Inc, Hampshire, IL www.wrmeadows.com.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.
- 3. Recycled Vinyl:
  - Light gray color.
  - b. Type Two Acceptable Products:
    - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.com.
    - 2) Equal as approved by Architect before Installation. See Section 01 6200.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

### A. Forms:

- 1. Assemble forms so forms are sufficiently tight to prevent leakage.
- 2. Properly brace and tie forms.
- 3. Make proper form adjustments before, during, and after concreting.
- 4. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Use APA Plyform B-B Class I, or APA HDO Plyform B-B Class I, on exposed to view concrete that do not receive a smooth rubbed finish.

### B. Accessories:

- General:
  - a. Provide for installation of inserts, templates, fastening devices, sleeves, and other accessories to be set in concrete before placing.
  - b. Position anchor bolts for hold-down anchors and columns and securely tie in place before placing concrete.
- 2. Form Release / Finish Agents:
  - a. Film thickness shall be no thicker than as recommended by Manufacturer.
  - b. Allow no release / finish agent on reinforcing steel or footings.
- 3. Expansion Joints:
  - a. Install at joints between floor slab and foundation wall where shown on Drawings.

### C. Form Removal (Slab on Grade):

- 1. Removal of forms can usually be accomplished in twelve (12) to twenty-four (24) hours.
- 2. If temperature is below 50 deg F or if concrete (stairs, beams, etc) depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.
- 3. For exposed to view surfaces that receive a smooth rubbed finish, remove forms while concrete is still "green".
- 4. Metal bars or prys should not be used. Use wood wedges, tapping gradually when necessary.

# 3.2 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Concrete Formwork:
    - a. Inspections are not required and will be performed at discretion of Architect.

END OF SECTION

# SECTION 03 1511 CONCRETE ANCHORS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Cast-in place and post-installed concrete anchors including:
    - a. Adhesive anchors for concrete.
    - b. Expansion anchors for concrete.
    - c. J-bolts and headed cast-in-place bolts.
    - d. Screw anchors for concrete.
    - e. Concrete anchors and inserts not specified elsewhere.
  - 2. Installer responsible when inspection results of concrete anchors require corrective actions.

# B. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
- 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation and inspection of cast-in-place anchors.
- 4. Section 06 1100: 'Wood Framing' for installation of drilled in anchors.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. American Concrete Institute:
    - a. ACI 355.4-11, 'Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary'.
    - b. ACI 548.12-12, 'Specification for Bonding Hardened Concrete and Steel to Hardened Concrete with an Epoxy Adhesive'.
  - 2. American National Standards Institute / American Welding Society (Following are specifically referenced for Structural Steel testing):
    - a. ANSI/AWS D1.1/D1.1M:2015, 'Structural Welding Code Steel'.
  - 3. ASTM International:
    - a. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength'.
    - b. ASTM A563-15, 'Standard Specification for Carbon and Alloy Steel Nuts'.
    - c. ASTM A706/A706M-16, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
    - d. ASTM F1554-15, 'Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength'.
    - e. ASTM F3125/F3125-15a, 'Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions'.
  - 4. International Code Council (IBC) (2015 or latest approved AHJ edition):
    - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
  - 1. Inspection shall be performed according IBC requirements.
  - 2. Notify Testing Agency and Architect one week before installing anchors so inspection may be scheduled.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product literature for each item.
- B. Informational Submittals:
  - Certificates:
    - a. Adhesive Anchors:
      - 1) Installer to provide current ACI/CRSI certification to Architect prior to installation of anchors.
  - Test And Evaluation Reports:
    - a. Provide ESR for products used indicating conformance with current applicable ESR Acceptance Criteria.
  - Manufacturer's Instructions:
    - a. Manufacturer's published installation recommendations for each item.
  - 4. Qualification Statements:
    - a. All concrete anchors except Adhesive Anchors:
      - Installer to provide record of installer installation training showing dates and those trained for all installed products when required when by Architect.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency inspection reports of all inspected anchors.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - Manufacturer:
    - a. Having sufficient capacity to produce and deliver required materials without causing delay in work.
  - Installer
    - a. Acceptable to Manufacturer, experienced in performing work of this section and has specialized in installation of work similar to that required for this project.
    - b. Adhesive Anchors:
      - 1) Adhesive Anchors installed in horizontal to vertical overhead orientation to support sustained tension loads shall be installed by Certified Adhesive Anchor Installer (AAI) as certified through ACI/CRSI:
        - a) Refer to most current version of ACI 318 for certification requirements.
        - b) Proof of current certification shall be submitted to the Architect for approval prior to commencement of installation.
    - c. All other Concrete Anchors:
      - 1) Arrange for manufacturer's field representative to provide installation training for all products to be used, prior to commencement of work:
        - a) Provide installation training when required by Architect.
- B. Field Inspection:
  - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - 2. Owner will provide Inspection for post-installed concrete anchors:
    - a. Owner will employ testing agency to perform inspection for post-installed concrete anchors as specified in Field Quality Control in Part 3 of this specification:
      - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.

CONCRETE ANCHORS - 2 - 03 1511

- B. Storage And Handling Requirements:
  - 1. Store materials protected from exposure to harmful weather conditions and as directed by Manufacturer.

#### PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. Concrete Anchors:
  - General:
    - Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Contract Drawings.
    - b. Install hot-dipped or stainless steel anchor bolts to attach wood sill plates to foundation with 1/4 inch by 3 inch x 3 inch minimum adjustable plate washers and standard cut washers between wood sill plates and nuts.
    - c. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
    - d. Conform to requirements of ASTM F3125/F3125 for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.
  - 2. Threaded rod for adhesive anchors and cast-in anchors:
    - Conform to requirements of ASTM A307, Grade A or ASTM F1554 Grade 36 unless indicated otherwise on Contract Drawings.
  - 3. Cast-In-Place Anchor Bolts:
    - a. J-Bolts:
      - 1) Non-headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
      - 2) Anchor hook to project 2 inches minimum including bolt diameter.
    - b. Headed Bolts:
      - 1) Headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
  - 4. Reinforcing Bars:
    - a. Composed of deformed carbon steel meeting requirements of ASTM A615/A615M, Grade 60.
  - Adhesive Anchors:
    - a. Products shall have current ESR conforming to current ICC Acceptance Criteria AC308 for concrete.
    - b. Rod diameter and embedment length as indicated on Contract Drawings.
    - c. Type Two Acceptable Products:
      - 1) HIT-RE 500V3 with SafeSet Epoxy Adhesive by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      - 2) Pure 110+ by Powers Fasteners Inc., Brewster NY www.powers.com.
      - 3) SET-XP Epoxy by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
      - 4) Equal as approved by Architect before installation. See Section 01 6200.
  - 6. Expansion Anchors:
    - a. Products shall have current ESR conforming to current ICC Acceptance Criteria AC193 for concrete.
    - b. Type Two Acceptable Products:
      - 1) KWIK Bolt TZ Expansion Anchor by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      - 2) Power-Stud +SD2 by Powers Fasteners Inc., Brewster NY www.powers.com.
      - 3) Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
      - 4) Equal as approved by Architect before installation. See Section 01 6200.
  - 7. Screw Anchors:
    - a. Provide anchors with length identification markings conforming to ICC Acceptance Criteria AC 193 for concrete.
    - b. Type Two Acceptable Products:
      - 1) KWIK HUS-EZ by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      - 2) Wedge-Bolt+ by Powers Fasteners Inc., Brewster NY www.powers.com.
      - 3) Titen HD by Simpson Strong Tie Co, Pleasonton, CA www.simpsonanchors.com.
      - 4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Embedded Items:
    - a. Identify position of reinforcing steel and other embedded items before drilling holes for anchors:
      - 1) Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items.
      - 2) Take precautions as necessary to avoid damaging pre-stressing tendons, electrical and telecommunications conduit, and gas lines.
    - b. Notify Engineer if reinforcing steel or other embedded items are encountered during drilling.
  - 2. Base Material Strength:
    - a. Unless otherwise specified, do not drill holes in concrete until:
      - 1) Concrete has minimum age of 21 days at time of anchor installation.
      - 2) Concrete has achieved full design strength for load achievement.

# 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Clean surfaces prior to installation.
  - 2. Prepare surface in accordance with Manufacturer's written recommendations.

## 3.3 INSTALLATION

- A. Post-Installed Anchors:
  - General:
    - a. Drill holes with rotary impact hammer drills using carbide-tipped bits.
    - b. Unless otherwise shown on Drawings, drill holes perpendicular to concrete surface.
    - c. Perform anchor installation in accordance with Manufacturer's published instructions.
  - 2. Adhesive Anchors:
    - a. Clean holes in accordance with Manufacturer's published instructions before installation of adhesive:
      - 1) Follow Manufacturer's recommendations to ensure proper mixing of adhesive components.
    - b. Adhesive:
      - 1) Inject adhesive into holes proceeding from bottom of hole and progressing toward surface so as to avoid introduction of air pockets into adhesive.
      - 2) Inject sufficient adhesive into hole to ensure that annular gap is filled to surface.
      - 3) Remove excess adhesive from surface and threads of anchor as necessary.
    - Shim anchors with suitable device to center anchor in hole. Do not disturb or load anchors before Manufacturer's specified cure time has elapsed.
    - d. Temperature
      - Observe Manufacturer's recommendations with respect to installation temperatures for adhesive anchors
      - Base material temperatures must be maintained above minimum temperatures allowed by Manufacturer for full required epoxy cure time.
  - 3. Expansion Anchors:
    - a. Protect threads from damage during anchor installation and prior to use.
    - b. Set anchors to Manufacturer's recommended torque, using a torque wrench. Following attainment of ten (10) percent of specified torque, one hundred (100) percent of specified torque shall be reached within 7 or fewer complete turns of nut. If specified torque is not achieved within required number of turns, remove and replace anchor, unless otherwise directed by Architect.
  - 4. Screw Anchors:
    - a. Protect threads from damage during anchor installation and prior to use.
    - b. Set anchor flush, collared.
    - c. Do not exceed Manufacturer's maximum allowed torque when seating anchor.

#### 3.4 FIELD QUALITY CONTROL

- A. Field And Inspections:
  - 1. Civil and structural field inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - 2. Expansion Anchors / Adhesive Anchors / Screw Anchors:
    - a. Certified Inspector from Testing Agency shall verify procedures used for installation of all concrete anchors and monitor their installation for compliance with Manufacturer's requirements.
    - b. Inspections:
      - Inspections shall include required verification and inspection of anchors as referenced in IBC Table 1704.4 and in accordance with most current version of ACI 318 or ACI 318M and applicable ASTM material standards that:
        - a) The correct rod/anchor is used; size and type.
        - b) The correct hole size is used and prepared per Manufacturer's instructions.
        - c) That climactic conditions, and concrete temperature, allow for the anchors' installation and use.
        - d) Proper hole cleaning equipment, per Manufacturer's instructions, is used.
        - e) Torque applied to anchors does not exceed Manufacturer's allowable limits.
        - f) Torque applied to anchors is per Manufacturer's instructions.

# B. Non-Conforming Work:

1. Contractor is to immediately notify Architect of incorrectly placed, misplaced or malfunctioning anchors and request instructions for corrective actions.

# 3.5 CLEANING

- A. Waste Management:
  - 1. Disposal of rubbish, debris, and packaging materials.

## 3.6 PROTECTION

- A. General:
  - 1. Protect installed products from damage during construction.

END OF SECTION

CONCRETE ANCHORS - 5 - 03 1511

# SECTION 03 1513 WATERSTOPS

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Waterstops for font footings and walls.
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of waterstop.

## 1.2 REFERENCES

- A. Reference Standards:
  - U.S Army Corps of Engineers (USACE):
    - a. CRD-C572-74, 'Specification for Polyvinylchloride Waterstops'.

#### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Manufacturer's product literature.
  - 2. Manufacturer's installation recommendations.

# PART 2 - PRODUCTS

#### 2.1 PRODUCTS

- A. Waterstops (Contractor Option):
  - 1. PVC:
    - Extruded from elastomeric polyvinylchloride to meet requirements of U.S. Army Corps of Engineers CRD-C572.
    - b. Category Four Approved Manufacturers. See Section 01 6200 for definition of Categories:
      - 1) Greenstreak Inc, St Louis, MO www.greenstreak.com.
      - 2) W R Meadows of Canada, Milton, ON www.wrmeadows.com.
  - 2. Bentonite:
    - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
      - 1) Waterstop-RX by CETCO, Arlington Heights, IL www.cetco.com.

# PART 3 - EXECUTION: Not Used

# END OF SECTION

WATERSTOPS - 1 - 03 1513

# SECTION 03 2100 REINFORCEMENT BARS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install concrete reinforcement bars as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
  - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 3. Section 03 1113: Structural Cast-In-Place Concrete Forming.
  - 4. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
    - a. Reinforcement installed in concrete.
    - b. Pre-installation conference held jointly with other concrete related sections.

### 1.2 REFERENCES

- A. Association Publications:
  - 1. American Concrete Institute:
    - a. ACI 'Detailing Manual' (2004 Edition).
  - 2. Concrete Reinforcing Steel Institute (CRSI):
    - a. CRSI, 'Manual of Standard Practice' (2009 28th Edition).
- B. Reference Standards:
  - 1. American Concrete Institute:
    - ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary' (Reapproved 2015).
    - b. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
  - 2. ASTM International (Following are specifically referenced for reinforcement bars testing):
    - a. ASTM A615/A615M-16, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.
  - 2. In addition to agenda items specified in Section 01 3100, and Section 03 3111, review following:
    - a. Installation scheduling and reinforcing placement.
    - b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
      - 1) Review requirements and frequency of testing and inspections.
- B. Scheduling
  - 1. Notify Testing Agency and Architect as directed in Section 03 3053 and Section 03 3111.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Reinforcing placement drawings.

- B. Informational Submittals:
  - Certificates:
    - Mill certificates for mill tests for reinforcing in accordance with ASTM A615/A615M.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency Inspection Reports of reinforcement bars.

# 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Comply with provisions of following codes and standards except where more stringent requirements are shown or specified:
    - a. American Concrete Institute:
      - 1) ACI 318, 'Building Code Requirements for Structural Concrete and Commentary'.
    - b. Concrete Reinforcing Steel Institute:
      - 1) CRSI, 'Manual of Standard Practice'.

#### B. Qualifications:

- 1. Throughout progress of the work of this section, provide at least one (1) person who shall be thoroughly familiar with Construction Documents and other applicable specified requirements, completely trained and experienced in necessary skills, and who shall be present at site and shall direct all work performed under this Section:
  - a. In actual installation of the work of this Section, use adequate numbers of skilled workmen to ensure installation in strict accordance with approved design.
  - b. In acceptance or rejection of work performed under this Section, no allowance will be made for lack of skill on part of workmen.
- C. Testing And Inspection:
  - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - 2. Owner will provide Testing and Inspection for inspection of reinforcement bars:
    - a. Owner will employ testing agencies to perform testing and inspection for inspection of reinforcement bars as specified in Field Quality Control in Part 3 of this specification:
      - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.
  - 2. Reinforcement bars shall be free of heavy rust scales and flakes, or other coating at time of delivery and placing.
- B. Storage And Handling Requirements:
  - 1. Properly protect rebar on site after delivery.

## PART 2 - PRODUCTS

## 2.1 MATERIAL

- A. Reinforcement Bars:
  - 1. Bars shall have grade identification marks and conform to ASTM A615/A615M:
    - a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
  - 2. Bars shall be deformed type.
  - 3. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

REINFORCEMENT BARS - 2 - 03 2100

#### 2.2 ACCESSORIES

# A. Bar Supports:

- 1. Concrete masonry units or bricks are not acceptable.
- 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CSRI, Class 2).
- 3. Type Two Acceptable Products:
  - a. Concrete 'dobies' or blocks wired to reinforcing.
  - b. Manufactured chairs with 4 sq. inch bearing surface on sub-grade, or other feature to prevent chair from being pushed into sub-grade or damaging vapor retarder under slabs on grade.
  - c. Equals as approved by Architect before installation. See Section 01 6200.

#### 2.3 FABRICATION

A. Fabricate reinforcement bars according to the Concrete Reinforcing Steel Institute (CRSI) 'Manual of Standard Practice' and details on Contract Documents.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION

#### A. General:

- 1. Avoid cutting or puncturing vapor retarder during reinforcement placement and concrete operations.
- 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- 3. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.
- 4. Reinforcement shall not be bent after partially embedded in hardened concrete.

# B. Placing Reinforcement:

- Comply with Concrete Reinforcing Steel Institute CRSI 'Manual of Standard Practice' recommended practice for 'Placing Reinforcing Bars' for details and methods of reinforcement placement and supports. and as herein specified.
- Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations:
  - a. Locate and support reinforcing by chairs, runners, bolsters, bar supports, spacers, or hangers, as required as recommended by 'ACI Detailing Manual, except slab on grade work.
  - b. Support bars in slabs on grade and footings with specified bar supports around perimeter and at 4-1/2 feet on center each way maximum to maintain specified concrete cover.
  - c. Install bar supports at bar intersections.
- 3. Bend bars cold.
- 4. Dowel vertical reinforcement for formed concrete columns or walls out of footing or structure below with rebar of same size and spacing required above.
- 5. Securely anchor and tie reinforcement bars and dowels before placing concrete. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

# C. Splices:

- 1. Non-Concrete Structural System:
  - a. Avoid splices of reinforcement bars at points of maximum stress. Lap bars 60 bar diameters minimum unless dimensioned otherwise on Drawings. Run reinforcement bars continuous through cold joints.
- 2. Concrete Structural System:
  - a. In beams, slabs, and walls, avoid splices of reinforcement bars at points of maximum stress.
  - b. Lap bars as follows:
    - 1) Compression Splices: 45 bar diameters minimum.
    - 2) Tension Splices: In accordance with ACI 318 Class B requirements.
    - 3) No splice shall be less than 20 inches
    - 4) For epoxy coated rebar, increase lap-splice lengths by 1.5 times those listed above.
  - c. In columns, splices in vertical bars are permitted only at floor levels or points of lateral support and shall consist of 45 bar diameter laps.
  - d. Run reinforcement bars continuous through cold joints.

#### D. Tolerances:

- 1. Provide following minimum concrete cover for reinforcement as per ACI 318 or ACI 318M. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations:
  - a. Concrete cast against and permanently exposed to earth:
    - 1) Interior Slabs on Grade: 1 inches4 inches2 inches 6 inches slabs.
    - 2) Sections other than Slabs: 3 inches
  - b. Concrete Exposed to Earth or Weather:
    - 1) No. 6 and Larger Bars: 2 inches
    - 2) No. 5 and Smaller Bars, W31 and D31 Wire: 1-1/2 inches

#### 3.2 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - 2. Reinforcement Bars:
    - a. Testing Agency shall provide inspection for Reinforcement Bars. See Section 03 3111 for Testing and Inspection requirements.

END OF SECTION

REINFORCEMENT BARS - 4 - 03 2100

# SECTION 03 3111 CAST-IN-PLACE STRUCTURAL CONCRETE

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install concrete work as described in Contract Documents including:
    - a. Quality of concrete used on Project but furnished under other Sections.
    - b. Concrete mix information and use of admixtures.
    - c. Field Quality Control Testing and Inspection requirements for concrete.
    - d. Pre-installation conference held jointly with other concrete related sections.
    - e. Sealants and curing compounds used with concrete.
    - f. Compact aggregate base for miscellaneous cast-in-place concrete.
    - g. Miscellaneous cast-in-place concrete and equipment pads.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Concrete accessories.
  - 2. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
  - 3. Light pole base anchors.
  - 4. Membrane Concrete Curing.
  - 5. Pipe bollards.

# C. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
- 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
- 4. Section 03 1511: 'Concrete Anchors and Inserts'.
- 5. Section 03 2100: 'Reinforcement Bars'.
- 6. Section 03 2116: 'Epoxy-Coated Reinforcement Steel Bars'.
- 7. Section 03 3517: 'Concrete Sealer Finishing' for application of concrete sealers.
- 8. Section 03 3923: 'Membrane Concrete Curing' for quality of curing materials used.
- 9. Section 05 1223: 'Structural Steel For Buildings' for:
  - a. Furnishing of pipe for pipe bollards.
- 10. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
- 11. Section 26 5600: 'Exterior Lighting' for furnishing of light pole base anchors.
- 12. Section 31 0501: 'Common Earthwork Requirements' for:
  - a. General procedures and requirements for earthwork.
  - b. Pre-installation conference held jointly with other common earthwork related sections.
- 13. Section 31 1123: 'Aggregate Base' for aggregate base under miscellaneous cast-in-place concrete and exterior slabs, under interior slabs-on-grade concrete, and asphalt paving.
- 14. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
- 15. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- 16. Section 31 2323: 'Fill' for compaction procedures and tolerances.
- 17. Section 32 8423: 'Underground Sprinklers' for sleeves for underground irrigation system.
- 18. Section 32 9121: 'Topsoil Grading' for grading of subgrade below topsoil.
- 19. Divisions 22, 23, And 26: Mechanical and electrical devices including boxes, conduits, pipes, hangers, inserts, and other work to be embedded in concrete work before placing.
- 20. Furnishing of items to be embedded in concrete specified in Section involved.
- 21. Owner will provide concrete leveling compounds and patching compounds required for carpet installation.

# 1.2 REFERENCES

A. Association Publications:

- 1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
  - a. Certifications:
    - ACI CP-1(16), 'Technical Workbook for ACI Certification of Concrete Field Testing Technician-Grade
       I'.
    - 2) ACI CP-10(10), 'Craftsman Workbook for ACI Certification of Concrete Flatwork Technician/Finisher'.
    - 3) ACI CP-19(16), 'Technical Workbook for ACI Certification of Concrete Strength Testing Technician'.
- 2. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below 40 deg F in twenty-four (24) hour period.
- 3. Floor Flatness (F<sub>F</sub>): Rate of change in elevation of floor over a 12 inches section.
- 4. Floor Levelness (F<sub>1</sub>): Measures difference in elevation between two points which are 10 feet apart.
- 5. Hot Weather, as referred to in this Section, is ambient air temperature above 100 deg F or ambient air temperature above 90 deg F with wind velocity 8 mph or greater.

## B. Reference Standards:

- 1. American Association of State and Highway Transportation Officials:
  - a. AASHTO M 153-06 (2016), 'Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction'.
- 2. American Concrete Institute
  - ACI 117-10 (R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
  - b. ACI 305.1-14, 'Specification for Hot Weather Concreting'.
  - c. ACI 306.1-90 (R2002), 'Standard Specification for Cold Weather Concreting'.
  - d. ACI 318-14, 'Building Code Requirements for Structural Concrete' (ACI 318) and 'Commentary on Building Code Requirements for Structural Concrete' (ACI 318R).
- 3. ASTM International:
  - ASTM C31/C31M-15, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
  - b. ASTM C33/C33M-16, 'Standard Specification for Concrete Aggregates'.
  - ASTM C39/C39M-15a, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
  - d. ASTM C94/C94M-16, 'Standard Specification for Ready-Mixed Concrete'.
  - e. ASTM C140/C140M-16, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
  - f. ASTM C143/C143M-15, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
  - g. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
  - h. ASTM C172/C172M-14a, 'Standard Practice for Sampling Freshly Mixed Concrete'.
  - i. ASTM C173/C173M-16, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
  - ASTM C192/C192M-16a, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
  - k. ASTM C231/C231M-14, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
  - I. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
  - m. ASTM C330/C330M-14, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
  - n. ASTM C494/C494M-15a, 'Standard Specification for Chemical Admixtures for Concrete.
  - o. ASTM C496/C496M-11, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
  - p. ASTM C567/C567M-14, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
  - q. ASTM C595/C595M-16, 'Standard Specification for Blended Hydraulic Cements'.
  - r. ASTM C618-15, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
  - s. ASTM C1077-16, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
  - t. ASTM C1157/C1157M-11, 'Standard Performance Specification for Hydraulic Cement'.
  - ASTM D1751-04(2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
  - v. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
  - w. ASTM E1155-14, 'Standard Test Method for Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers'.
- 4. International Code Council (IBC) (2015 or latest approved edition):
  - a. IBC Chapter 17, 'Special Inspections And Tests'.
    - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
    - 2) Section 1705, 'Required Special Inspection And Tests'.

a) Section 1705.2, 'Steel Construction'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

# A. Pre-Installation Conference:

- 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 and held jointly with following sections:
  - a. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
  - b. Section 03 2100: 'Reinforcement Bars'.
  - c. Section 03 2116: 'Epoxy-Coated Reinforcement Steel Bars'.
  - d. Section 22 1116: 'Domestic Water Piping'.
  - e. Section 26 0526: 'Grounding And Bonding For Electrical Systems'.
  - f. Section 32 3213: 'Cast-In-Place Concrete Retaining Walls'.
  - g. Section 33 1119: 'Fire Suppression Utility Distribution Piping'.
  - h. Section 33 3313: 'Sanitary Utility Sewerage'.
- 2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs.
- 3. In addition to agenda items specified in Section 01 3100, review following:
  - a. Set up concrete placement pour card system and verify that all relevant trades have signed off prior to concrete placement.
  - b. Obtaining trade sign-offs on each pour card will be responsibility of General Contactor's foreman or whoever is in charge of ordering concrete.
  - c. Pour cards will be turned in to Quality Assurance representative after the work has been completed so that they can be reviewed and filed.
  - d. Review installation scheduling, coordination, placement of building concrete, and placement of items installed in and under concrete.
  - e. Review installation scheduling, coordination and placement of site concrete and of items installed in concrete.
  - f. Review 'Verification of Conditions' requirements.
  - g. Review requirements for preparation of subgrade and aggregate base requirements.
  - h. Review formwork requirements.
  - i. Review approved mix design requirements, mix designs and use of admixtures.
  - j. Review reinforcing bar submittals.
  - k. Review installation schedule and placement of reinforcing bars.
  - I. Review placement, finishing, and curing of concrete, including cold and hot weather requirements.
  - m. Review joint layout plan for control and expansion joints, fillers for sidewalks, curbs, and gutters:
    - Review jointing requirements.
  - n. Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is 'green').
  - o. Review concrete slab tolerances and corrective measures if tolerances not met.
  - p. Review safety issues.
  - q. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
    - 1) Review requirements and frequency of testing and inspections.

## B. Scheduling:

1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete.

## 1.4 SUBMITTALS

#### A. Action Submittals:

- 1. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.
- 2. Shop Drawings:
  - a. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
  - b. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
  - c. Provide bar schedules and bending details.
  - d. Reinforced concrete walls shall be shown in scale elevation (scale at least one quarter inch to one foot).

    Details shall be in accordance with ACI rules.
  - e. Show all formwork for concrete surfaces which are to remain exposed in the finished work.

#### B. Informational Submittals:

- Certificates:
  - a. Installers:
    - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
    - 2) Certification for ACI-certified Flatwork Finishers and Technicians.
- 2. Design Data:
  - a. Mix Design:
    - 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
      - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140/C140M for hardened concrete properties.
      - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
  - b. Ready-Mix Supplier:
    - Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
      - a) Name of ready-mix batch plant.
      - b) Serial number of ticket.
      - c) Date and truck number.
      - d) Name of Contractor.
      - e) Name and location of Project.
      - f) Specific class or designation of concrete conforming to that used in Contract Documents.
      - g) Amount of concrete.
      - h) Amount and type of cement.
      - i) Total water content allowed by mix design.
      - i) Amount of water added at plant.
      - k) Sizes and weights of sand and aggregate.
      - I) Time loaded.
      - m) Type, name, manufacturer, and amount of admixtures used.
      - n) Design Data.
    - 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
      - a) Cement.
      - b) Aggregate.
      - c) Fly Ash.
- 3. Source Quality Control Submittals:
  - a. Concrete mix design: Submit mix designs to meet following requirements:
    - 1) Mix Type A (Used for footings):
      - General purpose concrete type mix used for footings and for exterior concrete (excluding concrete paving) where not subject to freeze/thaw cycles and deicing or where higher strength is needed due to soil conditions.
      - b) 3000 psi minimum at twenty-eight (28) days.
      - c) Water / Cementitious Material: 0.45 to 0.50 by weight.
    - 2) Mix Type B (Used for interior slabs on grade):
      - a) Unexposed interior concrete slabs on grade.
      - b) 3500 psi minimum at twenty-eight (28) days.
      - c) Water / Cementitious Material: 0.45 maximum by weight.
    - 3) Mix Type E (Used for foundations and exterior concrete):
      - a) Exterior concrete exposed to freeze/thaw cycles and deicing salts or where soils are 'corrosive'.
      - b) 4500 psi minimum at twenty-eight (28) days.
      - c) Water / Cementitious Material: 0.40 maximum by weight.
      - d) Use twenty-five (25) percent Class F fly ash as part of cementitious material.
      - e) Mix Type F should be used for all exterior concrete exposed to freeze/thaw cycles and deicing salts, unless dictated otherwise by site conditions.
      - f) For concrete paving, use mix design based upon use of 1-1/2 inches coarse aggregate (about 15 percent).
    - 4) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
    - 5) Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
  - b. Slump:
    - 1) 4 inch slump maximum before addition of high range water reducer.
    - 2) 8 inch slump maximum with use of high range water reducer.

#### c. Admixtures:

- 1) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
- 2) Fly ash: Amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed twenty-five (25) percent of weight of cementations materials may use.
- 3) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
- 4) Chemical: Special additives to promote rapid drying concrete may be used in interior concrete slabs on grade if necessary to meet construction schedules.

#### C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Record Documentation:
    - 1) Pour Reports:
      - a) Provide report that records following information:
      - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
      - Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
      - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
      - e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
      - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
      - g) Screeding method and equipment used.
      - h) Saw cut method and equipment used.
    - 2) Testing and Inspection Reports:
      - a) Testing Agency Testing and Inspecting Reports of concrete.

## 1.5 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
  - 1. Installers and Installation Supervisor:
    - a. ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
  - 2. Ready-Mix Supplier:
    - Comply with ASTM C94/C94M requirements and be certified according to NRMCA's 'Certification of Ready Mixed Concrete Production Facilities'.
  - 3. Testing Agencies:
    - a. Independent agency qualified according to ASTM C1077 and ASTM E329.
      - 1) Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technicians, Grade I according to ACI CP-1 or equivalent certification program.
      - 2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician Grade II.

# B. Testing And Inspection:

- 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
- 2. Owner will provide Testing and Inspection on concrete:
  - a. Owner will employ testing agencies to perform testing and inspection on concrete as specified in Field Quality Control in Part 3 of this specification:
    - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
    - 2) See Section 01 1200: 'Multiple Contract Summary'.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Expansion Joint Filler Material:
    - a. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage And Handling Requirements:
  - 1. Expansion Joint Filler Material:
    - a. Store materials in a clean, dry area in accordance with manufacturer's instructions.
    - b. Protect materials during handling and application to prevent damage.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

#### A. Manufacturers:

- Manufacturer Contact List:
  - a. Aridus Admixture by US Concrete, Euless, TX www.us-concrete.com/aridus/.
  - b. BASF (Construction Chemicals Division), Cleveland, OH www.master-builders-solutions.basf.us/en-us.
  - c. Bonsal American, Charlotte, NC www.bonsal.com.
  - d. Concure Systems Admixture by Concure Systems, Phoenix, AZ www.ConcureSystems.com.
  - e. Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
  - f. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
  - g. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.
  - h. GCP Applied Technologies, Cambridge, MA www.gcpat.com/construction/en-us.
  - i. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
  - j. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
  - k. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com and Sika Canada, Pointe Claire, QC www.sika.ca.
  - I. Unitex, Kansas City, MO www.unitex-chemicals.com.
  - m. U S Mix Products Co, Denver, CO www.usspec.com.
  - n. W R Meadows, Hampshire, IL www.wrmeadows.com.

#### B. Performance:

- Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise:
- 2. Capacities:
  - a. For testing purposes, following concrete strengths are required:
    - 1) At 7 days: 70 percent minimum of 28 day strengths.
    - 2) At 28 days: 100 percent minimum of 28 day strengths.

## C. Materials:

- 1. Hydraulic Cement: Meet requirements of ASTM C150/C150M, Type I or IA.
- 2. Aggregates:
  - a. General:
    - Submit a letter on quarry's letterhead that certifies all aggregate for concrete complies with the
      requirements of this section. Material certificates which are submitted shall be signed by both the
      materials producer and the contractor, certifying that materials comply with or exceed requirements
      specified herein to the Architect, Civil and Structural Engineering Consultant and the Independent
      Testing Laboratory for review and approval.
    - 2) Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.

#### b. Coarse:

- Meet requirements of ASTM C33/C33M or nonconforming aggregate that by test or actual service produces concrete of required strength and conforms to local governing codes.
- 2) Aggregate shall be uniformly graded by weight.
- c. Fine:
  - 1) Meet requirements of ASTM C33/C33M.

- 2) Aggregate shall be uniformly graded by weight.
- 3. Water: Clear, apparently clean, and potable.
- 4. Admixtures And Miscellaneous:
  - a. Fly Ash:
    - 1) Meet requirements of ASTM C618, Class F (or Class C where Class F is not available) and with loss on ignition (LOI) of three (3) percent maximum.
  - b. Chemical:
    - No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
    - 2) Air Entraining Admixture:
      - a) Meet requirements of ASTM C260/C260M.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 3) Water Reducing Admixture:
      - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 4) Water Reducing, Retarding Admixture:
      - Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 5) High Range Water Reducing Admixture (Superplasticizer):
      - Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
      - Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 7) Corrosion Inhibiting Admixture:
      - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
      - b) Type Two Acceptable Products:
        - (1) Eucon CIA by Euclid.
        - (2) DCI or DCI-S by GCP Applied Technologies.
        - (3) Equal as approved by Architect before use. See Section 01 6200.
    - 8) Alkali-Silica Reactivity Inhibiting Admixture:
      - Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
      - b) Type Two Acceptable Products:
        - (1) Eucon Integral ARC by Euclid.
        - (2) RASIR by W R Grace.
        - (3) Equal as approved by Architect before use. See Section 01 6200.
    - 9) Viscosity Modifying Admixture (VMA):
      - Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 10) Shrinkage Reducing Admixture (SRA):
      - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
      - o) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.
    - 11) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
      - a) Admixture specifically designed to promote rapid drying of concrete.
      - b) Type Two Acceptable Products:
        - (1) Equal as approved by Architect before use. See Section 01 6200.

#### 2.2 ACCESSORIES

#### A. Formwork:

1. Meet requirements specified in Section 03 1113:

# B. Bonding Agents:

- 1. Type Two Acceptable Products:
  - a. Acrylic Additive by Bonsal American.
  - b. Day Chem Ad Bond (J-40) by Dayton Superior.
  - c. Flex-Con by Euclid Chemical Co.
  - d. Larsen Weldcrete by Larsen Products Corp.
  - e. Everbond by L & M Construction Chemicals.
  - f. MasterEmaco A 660 (formally Acryl 60) by BASF.
  - g. U S Spec Multicoat by U S Mix Products.
  - h. Intralok by W R Meadows.
  - i. Equal as approved by Architect before use. See Section 01 6200.

# C. Expansion Joint Filler:

- a. Expansion Joint Filler Material:
  - Design Criteria:
  - Resilient, flexible, non-extruding, expansion-contraction joint filler meeting requirements of ASTM D1751.
  - 3) 1/2 inch thick.
  - 4) Resilience:
    - a) When compressed to half of original thickness, recover to minimum of seventy (70) percent of original thickness.
- b. Type Two Acceptable Products:
  - 1) Fiber Expansion Joint by W R Meadows, Hampshire, IL www.wrmeadows.com.
  - 2) Equal as approved by Architect before installation. See Section 01 6200.
- D. Finishing Material (Exposed Vertical Faces of Foundation and Retaining Walls):
  - 1. Finishing Material available in multiple concrete shades to closely match concrete surface.
  - 2. Type Two Acceptable Products:
    - a. Mixture of 1 part cement (using same cement as used in concrete foundations), 1 part sand with 95 percent passing #50 sieve.
    - b. RapidSet WunderFixx by CTS Cement Manufacturing Corporation, Cypress, CA www.rapidset.com.
    - c. Equal as approved by Architect before installation. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Concrete Forms:
    - a. Verify dimensions and spot elevations for locations of forms for concrete footings, stem walls, building slabs, curbs, gutters, walkways, and drainage systems are correct before concrete is placed.
      - 1) Notify Architect of incorrect dimensions or spot elevations in writing.
      - 2) Do not place concrete until corrections are made and verified.

# 3.2 PREPARATION

- A. Concrete Mixing:
  - General:
    - a. All concrete shall be machine mixed.
    - b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
    - c. Reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch
    - d. Re-tempering partly set concrete will not be permitted.

#### 2. Transit Mix:

- a. Transit mix concrete may be used provided it conforms to Specifications and tests herein described and ASTM C94/C94M.
- b. Central plant producing concrete and equipment transporting it are suitable for production and transportation of controlled concrete and plant is currently approved by local state DOT.
- c. Maximum elapsed time between time of introduction of water and placing shall be one (1) hour.
- d. Minimum time of mixing shall be one (1) minute per cubic yard after all material, including water, has been placed in drum, and drum shall be reversed for an additional two (2) minutes.
- Mixing water shall be added only in presence of Inspecting Engineer or inspector employed by Testing Agency.
- f. Trucks shall not be overloaded in excess of rated capacity as recommended by manufacturer.
- 3. Cold Weather Concreting Procedures:
  - a. General Requirements:
    - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
    - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be 35 deg F (2 deg C) minimum at time of concrete placement.
    - 3) Thaw sub-grade 6 inches (150 mm) deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
    - 4) Use no frozen materials or materials containing ice.
    - 5) See ACI 306.1 'Standard Specification for Cold Weather Concreting' for additional requirements.
- 4. Hot Weather Concreting Procedures:
  - a. General:
    - 1) Maximum concrete temperature allowed is 90 deg F in hot weather.
    - 2) Cool aggregate and subgrades by sprinkling.
    - 3) Avoid cement over 140 deg F.
    - 4) Use cold mixing water or ice.
    - 5) Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.
    - 6) See ACI 305.1 'Specification for Hot Weather Concreting' for additional requirements.

# B. Surface Preparation:

- 1. Earthwork Preparation:
  - a. Aggregate base and subgrade:
    - 1) Prepare aggregate base as specified in Section 31 1123.
    - 2) Prepare natural soil subgrade as specified in Section 31 2213.
    - 3) Prepare fill subgrade as specified in Section 31 2323.
- 2. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
- 3. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section:
  - a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

# C. Removal:

1. Remove water and debris from space to be placed:

# 3.3 INSTALLATION

- A. Placing Concrete:
  - 1. General:
    - a. Place as soon after mixing as possible.
    - b. Deposit as nearly as possible in final position.
    - c. No concrete shall be deposited in water.
    - d. Placing of concrete shall be continuous until panel or section is complete.
    - e. Compact concrete in forms by vibrating and other means where required.
      - 1) Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type G).
      - 2) Use and type of vibrators shall conform to ACI 309.
    - f. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
    - g. Consolidate concrete thoroughly.
    - h. Do not embed aluminum in concrete.

- i. Do not use contaminated, deteriorated, or re-tempered concrete.
- j. Avoid accumulation of hardened concrete.
- k. Dusting with cement not permitted.

#### 2. Footings:

- a. Level top of finish footing and leave rough.
- b. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, 48 inches long.
- 3. Foundation Walls: Leave steel projecting where required for floor tie.
- Exterior Slabs:
  - a. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs (2 inches at 6 inch slabs).
- 5. Miscellaneous Concrete Elements:
  - a. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
  - b. Light Pole Bases, Mow Strips, and Aprons:
    - 1) Install bond breaker consisting of three (3) layers of 30 lb roofing felt between pole base and adjoining sidewalk, mow strip and building foundations, and aprons and building foundations.
  - c. Mow Strips and Aprons:
    - 1) Aggregate base not necessary under mow strips and aprons.
    - 2) Form and cast mow strips in place.
    - 3) Set top of mow strip above finish grade as follows:
      - a) Sodded Areas: 2 inches below.
      - b) Ground Cover Areas: 2 inches below.
      - c) Trees and Shrub Areas (not individual trees): 4 inches below.
    - 4) Compact topsoil underneath mow strips and aprons to density of undisturbed earth.
  - d. Pipe Bollards:
    - 1) Install plumb and fill with concrete.
  - e. Sidewalks, Exterior Stairs, And Landings:
    - 1) Slope with cross slope of 1/8 to 1/4 inch per ft (one to two percent) in direction of intended drainage.
    - 2) Slope away from building 1/8 to 1/4 inch per ft (one to two percent) minimum.
    - Concrete walks shall be screeded to bring surface to grades and lines as indicated. Surface shall be floated with wood float with no coarse aggregate showing and then given broom finish before concrete sets

# 6. Joints:

- a. Control Joints (Contraction Joints):
  - Form control joints with early-entry, dry-cut saws as soon as final trowel operations are complete and joints can be cut without raveling.
  - Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch.
  - 3) Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
  - 4) Table One:

Concrete Control Joint On-Center Spacing (+/-			
Sidewalks	4 feet to 6 feet		
Curbs and Gutters	10 feet		
Mow Strips 3 feet to 5 feet			

## b. Expansion Joints:

- 1) Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
- 2) No expansion joint required between curbs and sidewalks parallel to curb.
- 3) Provide expansion joints at ends of exterior site concrete elements that are perpendicular to and terminate at curbs, building foundations or other concrete elements (i.e. sidewalks, mow strips, aprons).
- 4) Provide expansion joints between sidewalks that are parallel, and adjacent, to storage building or main building.
- 5) Provide expansion joints around perimeter of concrete slab on grade at mechanical enclosure, around perimeter of slab on grade at dumpster enclosure and at top and bottom of exterior stairs.

## 6) Table Two:

Concrete Expansion Joint (Isolation) On-Center Spacing (+/-			
Sidewalks, Curbs and Gutters	40 feet to 100 feet		
Mow Strips and Aprons 20 feet to 40 feet			

- 7) Seal expansion joints as specified in Section 07 9213 for following areas:
  - a) Between entryway slabs and building foundations.
  - b) Between sidewalks and building foundations.
  - c) Concrete retaining walls.
  - d) Within curbs and gutters.
  - e) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
- 8) Expansion joints are not required to be sealed for following areas:
  - a) Within aprons and where apron abuts sidewalks.
  - b) Within mow strips and where mow strip abuts building foundation and sidewalks.
  - c) Within sidewalks.
- 7. Bonding Fresh And Hardened Concrete:
  - a. Re-tighten forms.
  - b. Roughen surfaces.
  - c. Clean off foreign matter and laitance.
  - d. Wet but do not saturate.
  - e. Slush with neat cement grout or apply bonding agent.
  - f. Proceed with placing new concrete.
- 8. Anchor Bolts:
  - a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
  - Do not disturb bolts during finishing process.

#### B. Finishing:

- 1. Interior Concrete Flatwork:
  - a. Screed Concrete.
  - b. Float Finish:
    - 1) Float as soon after screeding as possible.
    - 2) Consolidate surface with power-driven floats with exception of areas inaccessible to power-driven floats, which may be hand-floated.
    - 3) Re-straighten, cutting down high spots and filling low spots.
    - 4) Repeat float passes and re-straightening until surface has uniform, smooth, granular texture.
  - c. Rough:
    - 1) Top of stairs to receive setting bed for ceramic or paver tile.
    - 2) Top of building slab to receive setting bed for ceramic or paver tile.
  - d. Trowel Finish:
    - 1) Steel trowel slab after concrete has set enough to avoid bringing water and fines to surface.
    - 2) Perform troweling with power-driven trowels with exception of areas inaccessible to power-driven trowels, which may be hand-troweled.
    - 3) Continue troweling passes and re-straightening with 10 foot highway straightedge until surface is free of trowel marks and uniform in texture and appearance.
    - 4) Apply burnished, burned-out trowel finish.
- 2. Exterior Concrete Flatwork:
  - a. Curb, Gutter, Sidewalks, Mow Strips, Stairs, And Miscellaneous:
    - After completion of final floating, performed immediately after screeding and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
      - a) Provide fine hair finish where grades are less than 6 percent 1-1/4 inch.
      - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch.
      - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
      - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.

- e) Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
- f) Round edges exposed to public view to 1/2 inch radius, including edges formed by expansion joints.
- g) Remove edger marks.
- Concrete Paving Finish is specified in Section 32 1313.
- 3. Vertical Surfaces (Exposed To View Vertical Surfaces, Exposed Retaining Walls, Exposed Foundation Walls, Concrete Piers, and etc.):
  - a. General:
    - 1) Finishing Material to fill and smooth interior and exterior concrete surface defects such as spalls, gouges, cracks, dents, chips, bug holes, stone pockets, honeycombs, voids and other defective areas.
    - 2) Chamfer lines shall be finished.
  - b. Surface Preparation:
    - 1) Formwork shall be stripped from concrete while concrete is still 'green'.
    - 2) Concrete surface to be finished immediately after formwork has been removed.
      - a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials and other irregularities, and cut back metal ties from surfaces to be exposed.
      - b) Repair defective areas and voids or stone pockets with Finishing Material and smooth to even surface matching surrounding undamaged area.
  - c. Smooth Rubbed Finish:
    - 1) Thoroughly wet with water, apply Finishing Material in thin layer, rub in circular motion to smooth uniform finish.
    - 2) Entire surface shall be protected from rapid drying for not less than three (3) days.
    - 3) Surfaces shall be cleaned of drip marks and discolorations.
    - Concrete surface shall be left with clean, neat, uniform finish, free from form markings and shall be uniform in color and texture.
- 4. Light Pole Bases:
  - a. Exposed portion to have smooth rubbed finish as specified in Vertical Surfaces in previous paragraph.

#### C. Curing:

- 1. Membrane Concrete Curing:
  - a. As specified in Section 09 3923 'Membrane Concrete Curing'.
  - b. Follow Manufacturer's written instructions for preparation, application rates, placement, and cleanup:
    - 1) Apply as soon as troweling on interior concrete is complete.
    - 2) Apply as soon as brooming or finishing of exterior concrete is complete.
    - 3) Spraying application is required.
    - 4) Do not dilute or thin product.
    - 5) Do not apply when temperature of concrete is less than 40 deg F
    - 6) Apply uniformly without puddles or ponding.
    - 7) Do not apply before bleed water has dissipated.
    - 8) Do not apply over standing water.

# D. Tolerances:

- General:
  - Tolerances shall conform to requirements of ACI 117 or CSA A23.1/A23.2, except where specified differently:
    - Floor test surfaces shall be measured and reported within seventy two (72) hours after completion of slab concrete finishing operations and before removal of any supporting shores to eliminate any curling effect F-numbers.
  - b. Maximum Variation Tolerances:
    - 1) Table Three:

Maximum Variation Tolerances			
Thickness, standard	plus 3/8 inch, minus 1/4 inch		
Thickness, footings	minus 0 inch		
Plan, 0 - 20 feet	1/2 inch		
Plan, 40 feet or greater 3/4 inch			
Plan, footings plus 1/2 inch			
Eccentricity, footings	2 inch maximum standard,		
Eccentricity, lootings	1/2 inch at masonry		
Openings, size minus 1/4 inch, plus one inch			

Openings, location	plus / minus 1/2 inch at center
Plumb	1/2 inch maximum
Consecutive Steps, treads	1/4 inch
Consecutive Steps, risers	1/8 inch
Flight of Stairs, treads	1/4 inch in total run
Flight of Stairs, risers	1/8 inch in total height

## 2. Local Flatness / Levelness of Interior Slabs:

- a. Carpet and Tile Areas:
  - 1) Specified Overall Value of  $F_F25$  /  $F_L20$  and Minimum Local Value of  $F_F15$  /  $F_L13$  when tested in accordance with ASTM E1155.
  - 2) Specified Overall Value of  $F_F30 / F_L20$  and Minimum Local Value of  $F_F18 / F_L13$  when tested in accordance with ASTM E1155 in ceramic, resilient or vinyl tiled areas.
  - 3) Used on building slabs to be covered by carpet and tile as shown on Contract Drawings. Verify and coordinate with Finish Schedule.
  - 4) Remedy For Out-of-Tolerance Building Slabs:
    - a) Sections of building slabs which do not meet specified tolerances but are within ten (10) percent of specified tolerances, may be corrected by grinding or filling, at Owner's option.
    - b) Remove and replace sections of slabs measuring outside specified correctable tolerances.
    - c) Carpet areas: If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.
- b. Wood Flooring Areas:
  - Specified Overall Value of F<sub>F</sub>50 / F<sub>L</sub>33 and Minimum Local Value of F<sub>F</sub>30 / F<sub>L</sub>20 when tested in accordance with ASTM E1155.
  - 2) Used on Cultural Hall building slabs as shown on Contract Drawings. Verify and coordinate with Finish Schedule.
  - 3) Remedy For Out-of-Tolerance Building Slabs:
    - Sections of slabs to be covered by wood flooring, which do not meet specified tolerances but are within ten (10) percent of specified tolerances, may be corrected by grinding or filling, at Owner's option.
    - b) Remove and replace sections of slabs measuring outside specified correctable tolerances.
    - c) If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances in wood flooring areas, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.

# 3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor:
      - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - 2. Reinforcement Bars and Bolts:
    - a. Testing Agency shall provide inspections will include following:
      - 1) Bolts:
        - a) Inspection of bolts to be installed in concrete prior to and during placement of concrete.
        - b) Periodic inspection of anchors installed in hardened concrete.
      - 2) Reinforcement Bars:
        - a) Periodic inspection of reinforcement bars and placement prior to concrete placement to verify grade, size, cover, spacing, and position of reinforcing.
        - b) Inspect that all reinforcement bars are be positively identified as to heat number and mill analysis.
        - c) Confirm surface of reinforcing bars is free of form release oil or other deleterious substances.
  - 3. Concrete:
    - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
    - c. Testing and inspections, if performed, will include following:
      - 1) Periodic inspection verifying use of required design mix.
      - 2) Inspection of reinforcing bars and anchor bolts before placement of concrete for proper installation.

- 3) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
- 4) Inspection of concrete placement for proper application techniques.
  - a) Steel tools are not to be used on exterior concrete.
- 5) Periodic inspection for maintenance of specified curing temperature and techniques:
  - a) Steel tools are not to be used on exterior concrete. Bull floating and finish floating is to be performed with magnesium or wood floats.
- 6) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
  - Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
- 7) Periodic inspection of concrete finishing operations for proper finishing techniques.
- 8) Periodic inspection for placement of specified curing compounds.
- c. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
  - Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
    - a) Slump: ASTM C143/C143M, test each time set of compressive specimens are made.
    - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
    - c) Concrete Temperature: Test each time set of compressive specimens are made.
    - d) Unit Weight: ASTM C567/C567M, test each time set of compressive specimens are made.
  - 2) Concrete floor flatness and floor levelness of interior slabs as per ASTM E1155.
  - 3) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
- d. Compression Test Specimen: ASTM C31/C31M, one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- e. Compressive Strength Tests: ASTM C39/C39M:
  - 1) Obtain one (1) composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 50 cu. Yd plus one (1) set for each additional 50 cu. yd or fraction thereof.
  - 2) One (1) specimen tested at seven (7) days, two (2) specimens tested at twenty-eight (28) days, and one (1) specimen retained in reserve for later testing if required.
  - If strength of field-cured cylinders is less than eighty-five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing inplace concrete.
  - 4) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- f. Samples:
  - 1) Fresh Concrete: ASTM C172/C172M except modified for slump to comply with ASTM C94/C94M.
    - a) Slump: ASTM C143/C43M, test each time set of compressive specimens are made.
    - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight.
    - c) Concrete Temperature: Test each time set of compressive specimens are made.
    - d) Unit Weight: ASTM C567/C567M, test each time set of compressive specimens are made.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

#### 3.5 CLEANING

- A. General:
  - 1. Curing:
    - a. Clean tools, equipment as directed by Manufacturer's instructions.

# 3.6 PROTECTION

A. Concrete:

- 1. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.
- 2. Do not allow materials resulting from construction activities, which will affect concrete or application of finish floor systems adversely, to come in contact with interior concrete slabs.
- 3. Protect interior concrete floors from stains, paint, mortar and other construction activities.

# B. Curing:

1. Restrict foot or vehicle traffic as curing membrane dries as recommended be Manufacturer.

END OF SECTION

# SECTION 03 3923 MEMBRANE CONCRETE CURING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Quality of membrane concrete curing as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for application of membrane concrete curing.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Curing: Process by which hydraulic-cement concrete matures and develops hardened properties, over time, as result of continued hydration of cement in presence of sufficient water and heat. Also used to describe action taken to maintain moisture and temperature conditions in freshly placed concrete.
- B. Reference Standards:
  - 1. American Association of State and Highway Transportation Officials:
    - a. AASHTO M 148-05, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing'.
  - ASTM International:
    - a. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.

## 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product data.
    - b. Material Safety Data Sheets (MSDS).
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Printed installation instructions.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - $1. \hspace{0.5cm} \hbox{Comply with applicable VOC standards and other local requirements}.$

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Follow Manufacturer's written instructions for handling and storage of product:
    - a. Store in unopened containers in clean, dry area between 35 deg F and 110 deg F (Keep from freezing) or as directed by Manufacturer's instruction.
  - 2. Shelf Life: Do not use curing compound that is over one (1) year from manufacturer date.

#### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not apply curing compound when temperature of concrete is less than 40 deg F

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Membrane Concrete Curing:
  - Description:
    - Clear water-based, ready-to use, dissipating membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
  - 2. Design Criteria:
    - a. VOC-compliant compound.
    - b. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
    - c. Interior concrete: containing no mineral spirits, naptha, or other components detrimental to finish flooring installation.
    - d. Maintain ninety-five (95) percent of mix water present in concrete mass after application.
    - e. Gradually dissipate after twenty-eight (28) days without leaving stain or discoloring concrete surface.
  - 3. Horizontal and Vertical Cast-In-Place Structural Concrete:
    - a. Type One Acceptable Products.
      - 1) Exterior and Interior Concrete:
        - a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg. OH www.daytonsuperior.com.
        - b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
        - c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
        - d) VOCOMP 20 (exterior concrete only, do not use when a concrete sealer will be applied in areas of freeze/thaw and deicer salts) by W.R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
        - e) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
    - b. Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

# SECTION 03 4800 PRECAST CONCRETE SPECIALTIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Precast concrete wall caps used at exterior mechanical enclosures and trash enclosures.
  - 2. Precast window headers, window sills or water table/column ledgers.

# B. Related Requirements:

- 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of detectable warning panels.
- 2. Section under 04 2000 heading: Installation of precast members.
- 3. Section 04 0523: 'Masonry Accessories' for flashing under precast units and cast in place anchor straps.
- 4. Section 04 2724: 'Cavity Wall Unit Masonry: Enclosure Walls' for installation of precast member for concrete wall cap at exterior mechanical enclosures and /or trash enclosures.
- 5. Section 05 1223: Metal Lintels.
- 6. Section 07 9213: 'Elastomeric Joint Sealants'.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - ASTM A615/A615M-16, 'Standard Specification for Deformed and Plain Steel Bars for Concrete Reinforcement'.
    - b. ASTM A1064/A1064M-16b, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
    - c. ASTM C33/C33M-16, 'Standard Specification for Concrete Aggregates'.
    - d. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
    - e. ASTM C260/C260M-10a(2016), 'Standard Specification for Air-Entraining Admixtures for Concrete'.
  - 2. ASTM International (following are referenced specifically for detectable warning panels):
    - ASTM C39/C39M-15a, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
    - b. ASTM C140-16, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'
    - c. ASTM C293/C293M-16, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)'.
    - d. ASTM C418-12, 'Standard Test Method for Abrasion Resistance of Concrete by Sandblasting'.
    - e. ASTM C947-03(2016), 'Standard Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete (Using Simple Beam With Third-Point Loading)'.
    - f. ASTM C1262-16, 'Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units'.

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer product literature for each type of product indicated.
  - Shop Drawings:
    - a. Precast concrete elements:
      - 1) Detail fabrication and installation of architectural precast concrete units.
      - 2) Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
      - Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
        - a) Indicate separate face and backup mixture locations and thicknesses.

- Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
- 5) Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
- 6) Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
- 7) Include plans and elevations showing unit location and sequence of erection for special conditions.
- 8) Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
- 9) Indicate relationship of architectural precast concrete units to adjacent materials.
- 10) Indicate locations and details of stone facings, anchors, and joint widths.
- b. Detectable warning panels:
  - 1) Detail fabrication details and installation of detectable warning panels.
  - 2) Indicate locations on site, plans, dimensions, shapes, and cross sections of each unit.
  - 3) Indicate joints locations and placement.
- 3. Samples:
  - a. Precast concrete elements:
    - For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
      - a) When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
        - 1) Grout Samples for Initial Selection: Color charts consisting of actual sections of grout showing manufacturer's full range of colors.
        - (2) Grout Samples for Verification: Showing color and texture of joint treatment.

#### B. Informational Submittals:

- Certificates:
  - a. Precast concrete elements:
    - 1) Material Certificates: For the following items, signed by manufacturers:
      - a) Admixtures.
      - b) Bearing pads.
      - c) Brick units and accessories.
      - d) Cementitious materials.
      - e) Reinforcing materials.
- 2. Design Submittals:
  - a. Precast concrete elements:
    - 1) Design Modifications:
      - If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings.
      - Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- 3. Source Quality Control Submittals.
  - a. Precast concrete units:
    - 1) Control test reports.
    - 2) Precast Concrete mix design: Submit compressive strength and water-absorption tests for each precast concrete mix design.
- 4. Field Quality Control Submittals:
  - a. Precast concrete units:
    - 1) Provide special inspection reports.
- 5. Qualification Statements:
  - Precast concrete units:
    - 1) Installer and Fabricator:
      - a) Letter certifying level of training and experience of Installer and Fabricator.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Check, carefully unload, and deliver material to site in such manner as to avoid soiling and damaging.
- B. Storage And Handling Requirements:
  - 1. Store material on planks clear of ground and protect from damage.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Materials:
  - 1. Design Criteria:
    - a. Precast Concrete:
      - 1) Air Entrainment: Wet cast mixture maintains 5 to 7 percent air entrainment where surfaces are exposed to freeze-thaw. Admixture conforms to ASTM C260.
      - 2) Aggregates: ASTM C33/C33M.
      - 3) Cement: ASTM C150/C150M, Type II.
      - 4) Compressive Strength: 4500 psi concrete minimum.
      - 5) Water: Potable water free from impurities.
    - b. Reinforcing:
      - 1) Bars: ASTM A615/A615M, Grade 60.
      - 2) Reinforcing Mesh: ASTM A1064/A1064M.
    - c. Concrete Elements:
      - 1) Color:
        - a) Color selected by Architect.
        - Integral Color: Concentrated dry powder iron oxide pigments designed to meet samples and mock-up.

#### 2.2 ACCESSORIES

A. Sealant: As specified in Section 07 9213: 'Elastomeric Joint Sealants'.

# 2.3 FABRICATION

- A. General:
  - 1. Chamfered edges.
  - 2. Smooth finish free from pits and rock pockets.
- B. Precast Concrete Elements:
  - 1. See Contract Documents for pre-cast sizes.
  - 2. Cast in aggregates.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Concrete wall caps.
  - 1. Install at exterior mechanical enclosures and/or trash enclosures.
  - 2. Coordinate all locations as described in Construction Documents.
- B. Precast Concrete Elements:
  - 1. Install at windows, columns, and entries as shown on drawings.
  - 2. Coordinate all locations as described in Construction Documents.

# END OF SECTION

# SECTION 03 6213 NON-METALLIC NON-SHRINK GROUTING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install structural grout as described in Contract Documents.
    - a. For grout base for structural columns.
    - b. For grout base for exterior light poles.
- B. Related Requirements:
  - 1. Section 04 0516: 'Masonry Grouting'.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. American Concrete Institute:
    - a. ACI 305R-10, 'Guide to Hot Weather Concreting'.
    - b. ACI 306R-10, 'Guide to Cold Weather Concreting'.
    - c. ACI 351.1R-12, 'Grouting Between Foundations and Bases for Support of Equipment and Machinery'.
- B. Reference Standards:
  - 1. ASTM International:
    - ASTM C1107/C1107M-14a, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).'
  - 2. United States Army Corps of Engineers (USACE):
    - a. CRD C-621-93, 'Handbook for Concrete and Cement Standard Specification for Packaged, Dry, Hydraulic-Cement Grout Nonshrink'.

#### 1.3 SUBMITTALS

- A. Action Submittals
  - 1. Product Data:
    - a. Manufacturer's data sheets on each product to be used, including:
      - 1) Preparation instructions and recommendations.
      - 2) Storage and handling requirements and recommendations.
      - 3) Manufacturer's printed installation instructions for each product.

# 1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact clearly identifying product name and manufacturer until time of use.
- B. Storage And Handling Requirements:
  - 1. Follow Manufacturer's recommendations including but not limited to following:
    - a. Store in clean, dry location.
    - b. Keep containers sealed until ready for use.
    - c. Store materials at room temperature before use.
  - 2. Protect materials during handling and placement to prevent damage or contamination.
    - a. Protect materials from freezing or overheating.
  - 3. Shelf Life: One (1) year minimum in original, unopened containers.

#### 1.5 FIELD CONDITIONS

- A. Ambient Conditions:
  - General:
    - a. Do not place grout over frozen concrete.
  - 2. Maintain environmental conditions and protect Work during and after installation to comply with referenced standards and Manufacturer's printed recommendations:
    - a. Do not install products under environmental conditions outside Manufacturer's recommendations.
  - 3. Follow ACI requirements for cold and hot weather concreting or Manufacturer's written instructions, whichever is more stringent:
    - a. Cold Weather Limitations:
      - 1) Follow requirements of ACI 306R for cold weather concreting.
    - b. Hot Weather Limitations:
      - 1) Follow requirements of ACI 305R for hot weather concreting.
    - c. ACI 305R-10, 'Guide to Hot Weather Concreting'.
    - d. ACI 306R-10, 'Guide to Cold Weather Concreting'.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Design Criteria:
  - 1. Description:
    - a. Commercial non-shrink, non-metallic grout.
  - 2. Meet following requirements:
    - a. ASTM C1107/C1107M, Type B or Type C.
    - b. Corps and Engineers CRD C-621.
    - c. Compressive strength of 6000 psi (41 MPa) minimum.
- B. Type Two Acceptable Products:
  - 1. Masterflow 928 by BASF Systems, Shakopee, MN or BASF Canada, Mississauga, ON www.buildingsystems.basf.com.
  - 2. ProSpec F77 by Bonsal American, Inc., Charlotte, NC www.bonsal.com.
  - 3. Advantage 1107 Grout by Dayton Superior Corporation, Oregon, IL www.daytonsuperiorchemical.com.
  - 4. NS Grout by Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
  - 5. Five Star Grout by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
  - 6. Duragrout by L&M Construction Chemicals Inc., Omaha, NE www.lmcc.com.
  - Planigrout 712 by MAPEI Corporation, Deerfield Beach, FL www.mapei.US or Mapei Inc., Laval, QC www.mapei.com/CA.
  - 8. SikaGrout 212 by Sika Corporation, Lyndhurst, NJ www.usa.sika.com or Sika Canada, Inc. Pointe-Claire, QC www.can.sika.com.
  - 9. MP Grout by US Mix Products Company, Denver, CO www.usspec.com.
  - 10. Sealtight CG-86 Grout by W R Meadows, Hampshire, IL www.meadows.com.
  - 11. Equal as approved by Architect before installation. See Section 01 6200.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify substrate is suitable for installation.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install board over unsuitable conditions.
    - b. Commencement of Work by installer is considered acceptance of substrate.

## 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Prepare concrete surfaces in accordance with Manufacturer's written instructions:
  - 2. Remove all loose materials.
  - 3. Clean surface of any substance that could interfere with bond on material including dirt, paint, tar, asphalt, wax, oil, grease, latex compounds, form release agents, laitance, loose toppings, foreign substances and any other residues.
  - 4. Saturate area to be grouted with water in accordance with Manufacturer's written instructions.

# 3.3 APPLICATION

#### A. General:

1. Follow Manufacturer's recommended thickness.

# B. Mixing:

- 1. Mix grout in accordance with Manufacturer's written instructions.
- 2. Add mix water in amount in accordance with Manufacturer's written instructions to provide required placing consistency.
- 3. Do not add water in amount that will cause bleeding or segregation of mixed grout.
- 4. Do not add any sand, cement, admixtures, or fluidifiers to grout.

# C. Placement:

- 1. Place grout in accordance with Manufacturer's written instruction including but not limited to the following:
  - a. Proper curing is required.
  - b. Use cold weather or hot weather grouting procedures in accordance with Manufacturer's written instructions, as temperature dictates:
    - 1) Do not use at temperatures that may cause premature freezing.
    - 2) Do not allow to freeze until 4000 psi is attained.
    - Employ cold weather or hot weather grouting practices as temperatures dictates.
- Completely eliminate air pockets and provide full contact between grout and item being grouted. Do not exceed Manufacturer's recommended thickness.

# D. Curing:

- 1. Cure grout in accordance with Manufacturer's written instructions or ACI curing practices.
- 2. Wet cure grout until forms are removed.
- 3. Seal grout surfaces after forms are removed as recommended by Manufacturer.
- E. Keep grout surfaces wet after curing compound has dried for as long as recommended by Manufacture.

# 3.4 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. Verify product has been installed as per Contract Documents and Manufacturer's written instructions.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.

#### 3.5 CLEANING

- A. Use clean water.
- B. Clean tools and equipment with water before material hardens.

# 3.6 PROTECTION

- A. Follow Manufacturer's recommendation for protection when applying material.
- B. Protect placed grout from freezing until minimum strength of 4000 psi is reached.
- C. Protect placed grout from damage during construction.

END OF SECTION

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# DIVISION 4 - MASONRY:

Masonry
Common Masonry Requirements
Cement and Lime Masonry Mortaring
Masonry Grouting
Masonry Reinforcing
Masonry Veneer Ties
Masonry Accessories
Unit Masonry
Brick Veneer Unit Masonry
Cavity Wall Unit Masonry: Enclosure Walls

DIVISION 04 MASONRY

# SECTION 04 0501 COMMON MASONRY REQUIREMENTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for Masonry including:
    - a. References.
    - b. Definitions.
    - c. Pre-Installation Conferences held jointly with masonry sections.
    - d. Joint backing for masonry control joints and masonry expansion joints.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' used with masonry joints.
  - 2. Sections Under 04 0000 Heading: 'Masonry':
    - a. Pre-installation conference held jointly with other masonry related sections including:
      - 1) Section 04 0513: 'Cement and Lime Masonry Mortaring'.
      - 2) Section 04 0519: 'Masonry Anchors And Inserts'.
      - 3) Section 04 2114: 'Brick Veneer Unit Masonry'.
      - 4) Section 04 2724: 'Cavity Wall Unit Masonry: Enclosure Walls'.

# 1.2 REFERENCES

- A. Association Publications:
  - The Brick Industry Association, Reston VA: 'Technical Notes on Brick Construction' (July 2012), www.gobrick.com.

#### B. Definitions:

- 1. Brick:
  - Cavity Wall Masonry: Wall consisting of two wythes of masonry in which space between wythes is not grouted.
  - b. Hollow Brick: Masonry unit of clay or shale whose net cross-sectional area in any plane parallel to bearing surface is not less than 60 percent of its gross cross-sectional area measured in same plane (See ASTM C652)
  - c. Solid Brick: Solid masonry unit of clay or shale, usually formed into rectangular prism while plastic and burned or fired in a kiln. Solid brick can have core holes whose area is no more than twenty-five 25 percent of total bed surface of the brick.
  - d. Running Bond: Same as common bond, with continuous horizontal joints, but vertical joints are offset or in line. Bricks of each course are offset from the previous instead of being right on top of each other. If running bond is being used with modular brick, end of brick will be at mid-point of brick on course below. Running bond only requires minimal cutting at each end and will easily follow a gentle curve. Running bond method most used.
  - e. Unit Masonry: as referred to in this specification is defined as Brick Veneer, Hollow Brick, Architectural Concrete, Composite, and Cavity Wall.
  - f. Warpage: Distortion of surfaces or edges of an individual brick from a plane surface or from straight line.
  - g. Wythe: Continuous vertical section of masonry one (1) unit in thickness.
- 2. Brick Classifications:
  - a. Brick Color:
    - 1) No color-related tolerances in ASTM standards for brick. Standards are dictated by sample panel, mockups, or project specification.
  - b. Brick Grade (durability and exposure):
    - 1) Brick is subjected to environmental and service conditions that vary. Brick is specified for its specific durability based on severity of weather and exposure and physical properties. Brick grades classifications are based on Weathering Index:
      - a) Grade SW: Severe weathering (stronger and more durable, and require less maintenance.
      - b) Grade MW: Moderate weathering (less durable).

 Grade NW: Negligible or no weathering (least durable and should only be used for interior work).

# c. Brick Types:

- 1) Type FBX:
  - a) Brick for general use in masonry where higher degree of precision and lower permissible variation in size than permitted for Type FBS.
  - b) Maintains strict requirements on absorption, waste, chipping, cracks, dimensions and distortion (warpage).
  - c) Allows very narrow color range, minimal size variations, and uniform in appearance.
- 2) Type FBS:
  - a) Brick for general use in masonry:
  - Wider range of color and size variations, but lack of production controls results in many odd color lots.
- 3) Type FBA:
  - a) Brick for general use in masonry selected to produce characteristic architectural effects resulting from non-uniformity in size and texture of individual units:
  - b) Used for aesthetic qualities.
  - c) Has no limits for size and color variations.
- 3. Cold Weather: as referred to in this Section, is four (4) hours with ambient temperature below 40 deg F in twenty-four (24) hour period.
- 4. Efflorescence: Deposit or encrustation of soluble salts, generally white and most commonly consisting of calcium sulfate that may form on surface of stone, brick, concrete, or mortar when moisture moves through and evaporates on masonry. Often caused by free alkalies leached from mortar, grout, adjacent concrete, or in clays. Test for efflorescence is described in ASTM C67 and CAN/CSA A82.
- 5. Flashing:
  - a. Cavity Wall Flashing: Same as flexible flashing.
  - b. Flashing: Thin impervious material placed in mortar joints and through air spaces in masonry to prevent water penetration and/or provide water drainage.
  - c. Flexible Flashing: Water-proof material typically used in cavity wall construction to contain and assist in proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
  - d. Foundation Flashing: Same as flexible flashing.
  - e. Head And Sill Flashing: Same as flexible flashing.
  - f. Through-Wall Flashing: Generally considered same as flexible flashing.
- 6. Hot Weather: as referred to in this Section, is ambient air temperature above 100 deg F or ambient air temperature above 90 deg F with wind velocity 8 mph or greater.
- 7. Masonry Joints:
  - a. Masonry Control Joint: Determines location of movement in concrete masonry walls that is due to volume changes resulting from shrinkage. Vertical control joint is vertical gap through concrete masonry wythe and filled with inelastic materials. Joint backing with sealant is used on exterior side of control joint to prevent water and air penetration. Concrete masonry generally shrinks over time.
  - b. Masonry Expansion Joint. Expansion joint separates brick masonry walls into segments to prevent cracking caused by changes in temperature, moisture expansion, elastic deformation, settlement and creep. Joints are formed by leaving continuous unobstructed opening through brick wythe that may be filled with highly compressible material. Joint backing with sealant is used on exterior side of expansion joint to prevent water and air penetration. Brick masonry generally expands over time.
- 8. Vents:
  - a. Weep Hole: Opening placed in mortar joints of facing material at level of flashing, to permit escape of moisture.
  - b. Weep Vent: Inserts placed in Weep Hole to screen insects from entering but allowing escape of moisture.
  - c. Vents (Open Head Joints): Placed at top of drainage air space to help reduce moisture buildup in air space by promoting ventilation. Weep vents may be placed vents to screen insects from entering but allowing movement of air through weep holes.

#### C. Reference Standards:

- 1. ASTM International:
  - a. ASTM D2000-12, 'Standard Classification for Rubber Products in Automotive Applications'.
  - b. ASTM D2240-15, 'Standard Test Method for Rubber Property-Durometer Hardness'.
  - ASTM D2287-12, 'Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds'.
- 2. International Building Code (IBC) (2015 or latest approved edition):
  - a. Chapter 17, 'Special Inspections And Tests':
    - Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.

- 2) Section 1705, 'Required Special Inspection And Tests':
  - a) Section 1705.2, 'Steel Construction'.
- Chapter 21, 'Masonry' for materials, design, construction and quality of masonry.
- 3. Masonry Standards Joint Committee (MSJC) The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
  - a. Building Code Requirements and Specification for Masonry Structures:
    - 1) TMS 402-13/ACI 530-13/ASCE 5-13 'Building Code Requirements for Masonry Structures'.
    - 2) TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Specification for Masonry Structures'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

 Coordinate work with other trades with items to be built into masonry such as electrical switches and plumbing faucets.

#### 3. Pre-Installation Conference:

- 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conferences:
  - a. Conduct conference at Project site.
  - b. Schedule pre-installation conference during construction of mockup panel.
- 2. In addition to agenda items specified in Section 01 3100, review following:
  - a. Review storage and handling requirements.
  - b. Review cold and hot weather procedure requirements.

#### C. Scheduling:

- 1. Brick Unit Veneer Masonry:
  - a. Structural Mortar:
    - Notify Testing Agency and Architect twenty-four (24) hours minimum before placing masonry units, reinforcing, mortar and/or grout.

# 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data: As specified in each masonry section.
  - 2. Samples: As specified in each masonry section.

# 1.5 QUALITY ASSURANCE

- A. Testing And Inspection:
  - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.

# B. Mockups:

- 1. Masonry Sample Panel:
  - a. Sample panel 4 feet long by 3 feet high of proposed color range, texture, bond, mortar, and workmanship. Include mock-up framing and sheathing to show wall construction to be used on Project, including:
    - 1) Anchor and tie systems.
    - 2) Any specialty details, such as reveals, soldier courses, window details.
    - 3) Expansion joints if required on Project.
    - 4) Flexible flashing and required components at foundation.
    - 5) Seismic reinforcing.
  - b. Sample panel(s) shall be constructed using 'production run' material to be used on Project unless otherwise approved in writing by Architect and/or Owner.
  - c. Sample panel(s) to be used as standard of comparison for masonry work built of same material.
  - d. Sample panel(s) shall remain at jobsite until all masonry is completed.
  - e. Do not start work until Architect has accepted sample panel(s).
  - f. At Architect's direction, demolish mock-ups and remove debris.

# 1.6 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. Check, carefully unload, and deliver material to site in such manner as to avoid soiling, damaging, or chipping.
  - 2. Do not use damaged masonry units, damaged components of structure, or damaged packaged materials.
  - 3. Masonry Accessories: Materials shall be delivered in original, unopened packages with labels intact.

# B. Storage And Handling Requirements:

- Aggregate:
  - a. Store different aggregates separately.
  - b. Store on high ground, or ideally, off ground to prevent contamination from dirt, organic materials and ground water, any of which may contribute to efflorescence and may be deleterious to mortar performance.
  - c. Store under protective cover to avoid saturation and freezing in cold weather.
- 2. Cementitious material:
  - a. Store in such manner as to prevent deterioration or intrusion of foreign material or moisture.
  - b. Do not use cementitious materials that have become contaminated.
  - c. Protect from precipitation and groundwater.
    - 1) Store materials on elevated platforms, under cover, and in dry location.
    - Do not use cementitious materials that have become damp or has become unsuitable for good construction.
- 3. Masonry accessories:
  - a. Store masonry accessories clear of ground, including metal items, to prevent corrosion and contamination by dirt and ground water which may contain soluble salts and other matter which may contribute to efflorescence and staining.
  - b. Plastic and asphalt coated flashing material should not be stored in areas exposed to sunlight. During installation, flashing must be pliable so that no cracks occur at corners or bends.
  - c. Protect from damage until installation.
- 4. Masonry units:
  - a. Store materials protected from exposure to harmful weather conditions as directed by manufacturer.
  - b. Store material on planks clear of ground which may contain soluble salts and protect from damage, dirt, or disfigurement.
  - c. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof membrane, securely tied. If units become wet, do not install until they are dry.
- 5. Masonry Reinforcement:
  - Protect reinforcement, ties, and metal accessories from permanent distortions, elements and store off ground.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Mortar
    - . Ideal mortar temperature is 70 deg F  $\pm$  10 deg F. Mixing temperature should be maintained within 10 deg F.
  - 2. Cold Weather Requirements. Implement approved cold weather procedures and comply with requirements contained in TMS 602/ACI 530.1/ASCE 6 including but not limited to following:
    - a. Preparation requirements (prior to conducting masonry work):
      - Do not lay masonry units having either temperature below 20 deg F or containing frozen moisture, visible ice. or snow on their surface.
      - 2) Do not use frozen materials or materials mixed or coated with ice or frost. Keep materials free of ice and snow. Do not lay masonry on frozen material. Remove and replace unit masonry damaged by frost or by freezing conditions.
      - 3) Remove visible ice and snow from top surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.
      - 4) Preparation of mortar.
    - b. Construction requirements (work in progress and based on ambient air temperature):
      - Do not heat water or aggregates used in mortar or grout above 140 deg F. Comply with cold weather requirements for ambient air temperatures prior to conducting masonry work in accordance with TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.
  - 3. Hot Weather Requirements. Implement approved hot weather procedures and comply with requirements contained in TMS 602/ACI 530.1/ASCE 6 including but limited to following:
    - a. Preparation (prior to conducting masonry work). Comply hot weather procedures when:

- Ambient air temperature exceeds 100 deg F, or exceeds 90 deg F with wind velocity greater than 8 mph.
- 2) Ambient temperature exceeds 115 deg F, or exceeds 105 deg F with wind velocity greater than 8 mph.
- Construction requirements (work in progress). Comply hot weather procedures when prior to conducting masonry work in accordance with TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.

# PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Masonry Control Joints (if shown on Contract Drawings):
  - 1. Description:
    - a. Extruded rubber or PVC.
    - b. Joint backing (backer rod).
    - c. Elastomeric joint sealant.
  - 2. Design Criteria:
    - a. Extruded Rubber:
      - 1) Meet requirements of ASTM D2000 2AA-805.
    - b. PVC:
      - 1) Meet requirements of ASTM D2287 (Type PVC 654-4) with durometer hardness of 85 (+ or -5) when tested in accordance with ASTM D2240.
    - c. Type One Acceptable Products:
      - 1) RS standard rubber control joint by Hohmann & Barnard.
      - 2) VS standard PVC control joint by Hohmann & Barnard.
      - 3) Equals as approved by Architect.

#### B. Masonry Expansion Joints:

- Description:
  - a. Closed Cell Neoprene Sponge without tear strip placed horizontally beneath relieving angle, or in vertical expansion joint to act as control joint.
  - b. Joint backing (backer rod).
  - c. Elastomeric joint sealant.
- 2. Design Criteria:
  - a. Extruded Rubber:
    - 1) Meet requirements of ASTM D1056 Grade 2A1.
  - b. Type One Acceptable Products:
    - 1) NS neoprene sponge by Hohmann & Barnard.
    - 2) Equals as approved by Architect.

# PART 3 - EXECUTION - NOT USED

# **END OF SECTION**

# SECTION 04 0513 CEMENT AND LIME MASONRY MORTARING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of masonry mortar used on Project.
- B. Related Requirements:
  - 1. Section 04 0501: 'Common Masonry Requirements'.
  - 2. Sections Under 04 2000 Heading: Furnish and install mortar.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. See Section 04 0501: 'Common Masonry Requirements' for common masonry definitions.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C144-11, 'Standard Specification for Aggregate for Masonry Mortar'.
    - b. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
    - c. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
    - d. ASTM C270-14a, 'Standard Specification for Mortar for Unit Masonry'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501: 'Common Masonry Requirements'.

# 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. If pre-mixed wet mortar or pre-blended dry mortar mix are to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
    - b. If site mixed / blended mortar is to be used, provide written description of proposed method of measuring and mixing of materials.

# 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
  - 1. Cementitious material:
    - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Design Criteria:
  - 1. Mixing:
    - a. Meet either proportion or property specifications of ASTM C270 for masonry mortar as per Table 3 'Proportion Specifications' and Table 4 'Physical Requirements for Masonry Cement Mortars'.
    - b. Conform with requirements of ASTM C780 and ASTM C1586.
    - c. Machine mixing should be used whenever possible.
  - 2. Mortar Minimum Compressive Strength at twenty-eight (28) days:
    - a. Type N: 750 psi.
      - 1) Brick Veneer Unit Masonry.
      - 2) Cast Stone Masonry.
      - 3) Cavity Wall Unit Masonry: Enclosure Walls.

#### B. Materials:

- 1. Portland Cement:
  - a. Meet requirements of ASTM C150/C150M and ASTM C270.
- 2. Hydrated Lime:
  - Meet requirements of ASTM C207 for hydrated lime.
- Aggregate:
  - a. Meet requirements of ASTM C144 and ASTM C270.
- 4. Water:
  - a. Clean and free of acids, alkalis, and organic materials.
- Admixtures:
  - a. Use no admixtures, except for color pigments specified below, without Architect's written permission. Use of any admixture to meet cold weather requirements and admixtures that increase air entrainment are expressly forbidden under all circumstances.
- 6. Mortar Color Pigment:
  - a. High purity, chemically inert, unfading, alkali-fast mineral oxides, finely ground and especially prepared for
  - b. Color Standard: As selected by Architect.
  - c. Type One Acceptable Products:
    - 1) True Tone Mortar Colors by Davis Colors, Los Angeles, CA www.daviscolors.com.
    - 2) SGS Mortar Colors by Solomon Colors, Springfield, IL www.solomoncolors.com.
    - 3) Equal as approved by Architect before bidding. See Section 01 6200.

#### C. Mixes:

- 1. General:
  - a. Heat water and sand to 140 deg F maximum if temperature is below 40 deg F.
- 2. Unit Masonry for mortar as specified in each Masonry specification section:
  - a. Proportions of ingredients in compliance with proportion specification of ASTM 270 using Portland cement.

#### PART 3 - EXECUTION

#### 3.1 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Field tests and inspection as specified in 04 0501: 'Common Masonry Requirements'.
  - 2. Sampling and testing of mortar is not required.

# END OF SECTION

# SECTION 04 0516 MASONRY GROUTING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of masonry grout used on Project.
- B. Related Requirements:
  - 1. Section 04 0501: 'Common Masonry Requirements'.
  - 2. Sections under 04 2000 heading: Furnish and install masonry grout.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. See Section 04 0501 for common masonry definitions.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C143/C143M-15a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
    - b. ASTM C404-11, 'Standard Specification for Aggregates for Masonry Grout'.
    - c. ASTM C476-16, 'Standard Specification for Grout for Masonry'.
    - d. ASTM C1019-16, 'Standard Test Method for Sampling and Testing Grout'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.

# 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. If pre-blended dry grout is to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
    - If grout is to be mixed in field, provide written description of proposed procedure for measuring and mixing
      of materials.

# 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. As specified in Section 04 0501.
- B. Storage And Handling Requirements:
  - 1. Cementitious material:
    - a. As specified in Section 04 0501.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Design Criteria:
  - 1. Provide grout that conforms to requirements of ASTM C476 and TMS 602/ACI 530.1/ASCE 6.
- B. Materials:
  - 1. Proportions of Ingredients:
    - a. Grout proportions shall be determined by one of following methods:
      - 1) As per ASTM C476 Table 1: 'Grout proportions by Volume' for fine and coarse grout.
      - Specified Compressive Strength: Proportions established by twenty-eight (28) day compressive strength tests in accordance with Test Method ASTM C1019 that obtain specified compressive strength:
        - a) Grout shall be mixed to slump of 8 to 11 inches as determined by Test Method ASTM C143/C143M and shall have minimum compressive strength of 2000 psi at 28 days.
  - 2. Production Methods: Grout shall be produced using one of following procedures:
    - a. Materials mixed at job site:
      - 1) Individual cementitious materials and aggregates stored at job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
      - Individual dry ingredients transported to job site in suitable compartments shall be mixed with water at
        job site using continuous volumetric proportioning equipment to achieve desired consistency. Mix
        with auger of appropriate length to provide adequate mixing.
    - b. Mixed materials transported to job site:
      - Factory dry-blended cementitious materials and aggregates delivered to job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
      - Wet-mixed grout shall arrive at job site in ready-mixed condition. Slump shall be adjusted as necessary, and grout shall be re-mixed at mixing speed for at least one minutes before discharging to achieve desired consistency.
    - c. Grout may be hand mixed on small jobs with written approval of mixing procedure by Architect.
  - 3. Portland Cement:
    - a. Meet requirements of ASTM C94/C94M, ASTM C150/C150M and ASTM C476.
  - 4. Aggregate:
    - a. Meet requirements of ASTM C144, ASTM C404, and ASTM C476.
  - 5. Water: Clean and potable free of acids, alkalis, and organic materials.
  - 6. Admixtures:
    - a. No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.
  - 7. Antifreeze Compounds:
    - a. No antifreeze liquids, salts or other substances shall be used in grout to lower freezing point.

# PART 3 - EXECUTION - NOT USED

END OF SECTION

MASONRY GROUTING - 2 - 04 0516

# SECTION 04 0520 MASONRY REINFORCING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Masonry horizontal joint reinforcing.
  - 2. Steel reinforcing bars.
- B. Related Requirements:
  - 1. Sections under Division 03 'Concrete' for placement of dowels out of foundations for masonry reinforcing.
  - 2. Section 04 0501: 'Common Masonry Requirements' for installation of masonry reinforcing.
  - 3. Sections under 04 2000 Heading: 'Unit Masonry' for masonry units using masonry reinforcing.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ACI 117-10(R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
- B. Definitions:
  - See Section 04 0501 for common masonry definitions.
- C. Reference Standards:
  - ASTM International:
    - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM A615/A615M-16, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
    - c. ASTM A951/A951M-16, 'Standard Specification for Steel Wire for Masonry Joint Reinforcement'.
    - d. ASTM A1064/A1064M-16b, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
  - 2. CSA Group (Canadian Standards Association):
    - a. CSA G30.18-09 (2014), 'Carbon Steel Bars for Concrete Reinforcement'.

# 1.3 SUBMITTALS

- A. Informational Submittals:
  - Certificates:
    - a. Mill certificate.
  - 2. Fabricator Instructions:
    - Reinforcing bar placement drawings.

# 1.4 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. Steel reinforcing bars shall be free of heavy rust scales and flakes, and other bond-reducing coatings at time of delivery and placing.
  - 2. Separate steel reinforcing bars by size and tag with manufacturer's heat or test identification number.
  - 3. Tag continuous joint reinforcing with Manufacturer's name, wire size, and ASTM / CSA specification.
- B. Storage And Handling Requirements:
  - 1. Properly protect reinforcing on site after delivery.

#### PART 2 - PRODUCTS

# 2.1 SYSTEMS

#### A. Manufacturers:

- Manufacturers Contact List:
  - a. Heckman Building Products Inc, Chicago, IL www.heckmannbuildingprods.com.
  - b. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
  - c. Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.

#### B. Materials:

- 1. Design Criteria:
  - a. Steel Reinforcing Bars:
    - Steel reinforcing bars shall have grade identification marks and meet requirements of ASTM A615/A615M, Grade 60 minimum. All but No. 2 bars shall be deformed type.
  - b. Cold-drawn steel conforming to ASTM A1064/A1064M.
  - c. Continuous Joint Reinforcing:
    - Conform to ASTM A1064/A1064M. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A153/A153M, Class B-2. Interior wall reinforcing shall be galvanized to meet requirements of ASTM A1064/A1064M, Class A.
    - 2) Size: 2 inches less than nominal thickness of wall.
    - 3) Rod Size:
      - a) Side rods: 9 gauge or 3/16 inch diameter.
      - b) Cross rods: 9 gauge or 3/16 inch diameter.
    - 4) Cross rods that serve as metal ties in exterior cavity and other multi-wythe walls shall be drip crimped.
    - 5) Corners And Tee Sections: Prefabricated of material and design similar to main reinforcement.
    - Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft² after fabrication).
- 2. Multi-Wythe Masonry:
  - a. Where bed joints of wythes align, use joint reinforcing extending across wythes.
    - Prefabricated joint reinforcement for embedment in horizontal mortar joints tying multi-wythe masonry walls together.
  - b. Where bed joints of wythes do not align, use:
    - 1) Type Two Acceptable Products. See Section 01 6200:
      - No. 170-2X S.I.S. Truss Eye-Wire Adjustable Truss Eye-Wire w/2X-Hook & Seismiclip Interlock System by Hohmann & Barnard.
      - b) No. 270-2X-SH Ladder adjustable reinforcement with 2X-Seismic Hook by Hohmann & Barnard.
      - c) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.

#### C. Fabrication:

- 1. Fabricate and bend steel reinforcing bars according to 'ACI Detailing Manual' (2004 edition or latest available) and as detailed on Contract Drawings.
- 2. Reinforcement:
  - a. Fabricate reinforcing bars in accordance with fabricating tolerances of ACI 117.
  - b. Bend bars cold and do not heat bars.
  - c. Do not bend Grade 40 bars in excess of 180 degrees. Minimum inside diameter of bend is five bar diameters.
  - d. Minimum inside bend diameter for other bars is as follows:
    - No. 2 through No. 8 (M #10 through M #25): 6 bar diameters.
    - 2) No. 9 through No. 11 (M #29 through M #36): 8 bar diameters.
  - e. Provide standard hooks that conform to following:
    - 1) Standard 180-degree hook: 180-degree bend plus minimum extension of 4 bar diameters or 2-1/2 inch, whichever is greater.
    - 2) Standard 90-degree hook: 90-degree bend plus minimum extension of 12 bar diameters.
    - 3) For stirrups and tie hooks for No. 5 (M #I6) bar and smaller: 90-degree or 135-degree bend plus minimum of 6 bar diameters or 2-1/2 inch, whichever is greater.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Interface With Other Work:
  - Coordinate with Division 03 'Concrete'.

#### B. Reinforcement

- 1. Basic requirements:
  - Place reinforcement in accordance with the sizes, types, and locations indicated on Contract Drawings and as specified.
  - b. Do not place dissimilar metals in contact with each other.
  - c. Reinforcing shall be free of material that may destroy bond.
  - d. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing
  - e. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond allowable tolerances.
  - f. Unless accepted by Architect, do not bend reinforcement after it is embedded in grout or mortar.
  - g. Brick Veneer Unit Masonry:
    - 1) Attach joint reinforcing to brick veneer ties in accordance with Manufacturer's instructions.
- 2. Placing Reinforcement:
  - a. Completely embed reinforcing bars in grout in accordance with 'Grout Placement' as specified in Installation requirements in Part 3 of Section 04 0501: 'Common Masonry Requirements'.
  - b. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
  - c. Maintain clear distance between reinforcing bars and interior of masonry unit or formed surface of at least 1/4 inch for fine grout and 1/2 inch for coarse grout.
  - d. Place reinforcing bars maintaining the following minimum cover:
    - 1) Masonry face exposed to earth or weather:
      - a) 2 inch for bars larger than No. 5 (M #16).
      - b) 1-1/2 inch for No. 5 (M #16) bars or smaller.
  - e. Maintain minimum clear distance between parallel bars of the nominal bar size or 1 inch, whichever is greater.
  - f. In columns and pilasters, maintain minimum clear distance between vertical bars of one and one-half times nominal bar size or 1-1/2 inch, whichever is greater.
  - g. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections. See Contract Drawings.
- 3. Splicing:
  - a. Splice reinforcing steel as shown on Contract Drawings.
  - b. Noncontact lap splices: Position bars spliced by noncontact lap splice no farther apart transversely than one-fifth specified length of lap nor more than 8 inch.
- 4. Continuous Joint Reinforcing (Multiple-Wythe Unit Masonry):
  - a. Beginning approximately 8 inch from base of masonry, provide joint reinforcing 16 inches on center vertically, except 8 inch on center if drip crimped unless noted otherwise in Contract Drawings.
  - b. Maximum offset between brick and block coursing is 1-1/4 inch using ladder adjustable-wire reinforcement or ladder adjustable-wire reinforcement with seismic hook type reinforcing. If brick and block coursing is exactly lined up, ladder adjustable-wire reinforcing may be used. However, such reinforcing may not be bent to fit coursing that does not line up.
  - c. Lap splices and intersections minimum of 6 inch.
  - d. Ensure that all ends of longitudinal wires of joint reinforcement at laps are embedded in mortar or grout.
- 5. Placement tolerances:
  - a. Place reinforcing bars in walls and flexural elements within tolerance of  $\pm \frac{1}{2}$  inch when:
    - 1) Distance from centerline of reinforcing bars to opposite face of masonry is equal to 8 inch or less.
    - 2) ± 1 inch for centerline of reinforcing bars to opposite face of masonry equal to 24 inch or less but greater than 8 inch.
    - $\pm$  1-1/4 inch for centerline of reinforcing bars to opposite face of masonry greater than 24 inch.
  - b. Place vertical bar within:
    - 1) 2 inch of required location along length of wall when wall segment length exceeds 24 inch.
    - 2) 1 inch of required location along length of wall when wall segment length does not exceed 24 inch.
  - c. If it is necessary to move bars more than one (1) bar diameter or distance exceeding tolerance stated above to avoid interference with other reinforcing steel, conduits, or embedded items, notify Architect for acceptance of resulting arrangement of bars.
  - d. Foundation dowels that interfere with unit webs are permitted to be bent to maximum of 1 inch horizontally for every 6 inch of vertical height.

# 3.2 CLEANING

- A. Waste Management:
  - 1. Disposal of rubbish, debris, and packaging materials.

END OF SECTION

MASONRY REINFORCING - 4 - 04 0520

# SECTION 04 0521 MASONRY VENEER TIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Ties for attaching brick veneer to framed walls.
- B. Related Requirements:
  - 1. Section 04 0501: 'Common Masonry Requirements' for installation of anchor and tie system.
  - 2. Section 04 0520: 'Masonry Reinforcing' for quality of seismic masonry reinforcing.
  - 3. Sections Under 04 2000 Heading: 'Unit Masonry' for installation of masonry units using anchor and tie system.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - ASTM A1008/A1008M-15, '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'

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product literature or cut sheet for each item showing compliance with design criteria requirements as specified.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Manufacturer's published test results showing performance characteristics.
  - 2. Manufacturer's Instructions:
    - a. Manufacturer's published installation instructions for each item.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact Information:
    - a. Heckman Building Products Inc, Melrose Park, IL www.heckmannbuildingprods.com.
    - b. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
    - c. Wire-Bond by Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
- B. Design Criteria:
  - 1. Seismic Anchors:
    - a. Seismic anchors for Seismic Design Categories A, B, C, D, E, and F.
    - b. Comply with seismic requirements for continuous wire in veneer to be integral component of anchor system.
  - 2. Wire (Carbon Steel):
    - a. As specified in Section 04 0520.

- C. Brick Veneer Unit Masonry Attached to Framing:
  - 1. Brick Ties:
    - a. Design Criteria:
      - 1) Sheet Metal (Carbon Steel):
        - a) Meet requirements of ASTM A1008/A1008M.
        - b) Provide seismic notch to accommodate 9 ga or 3/16 inch diameter continuous wire
        - :) Thickness: 14 ga.
      - 2) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
      - 3) Tie Length: Length includes cavity air space and 1-1/2 inches brick overlap as per code.
    - b. Type Two Acceptable Products:
      - 1) 360 L-Type Seismic Anchor by Heckmann.
      - 2) 345 SV Seismic-Notch Veneer Anchor by Hohmann & Barnard.
      - 3) 2522 Seismic Veneer Anchor by Wire-Bond.
      - 4) Equals meeting Design Criteria as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

MASONRY VENEER TIES - 2 - 04 0521

# SECTION 04 0523 MASONRY ACCESSORIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Drip edge/plate.
  - 2. Flexible flashing for brick sills.
  - 3. Flexible flashing for bottom of masonry veneer.
  - 4. Mortar guard.
  - 5. Precast concrete wall cap flashing.
  - 6. Termination bar.
  - 7. Weep vents.
  - 8. Vents (open head joints).
- B. Related Requirements:
  - 1. Section 04 0501: 'Common Masonry Requirements' for installation of masonry accessories.
  - 2. Section 04 0519: 'Masonry Anchors And Inserts'.
  - 3. Section 04 0521: 'Masonry Veneer Ties'.
  - 4. Sections Under 04 2000 Heading: 'Unit Masonry' for masonry accessories used in unit masonry.

# 1.2 REFERENCES

- A. Definitions:
  - 1. See Section 04 0501 for common masonry definitions.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM A240/A240M-16, 'Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications'.
    - c. ASTM A580/A580M-15, 'Standard Specification for Stainless Steel Wire'.
    - d. ASTM D903-98(2010), 'Standard Test Method for Peel or Stripping Strength of Adhesive Bonds'.
    - e. ASTM D1056-14, 'Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber'.

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - Manufacturer's product literature or cut sheet for each item showing compliance with design criteria requirements as specified.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Manufacturer's published test results showing performance characteristics.
  - 2. Manufacturer's Instructions:
    - a. Manufacturer's published installation instructions for each item.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

- b. Record Documentation:
  - 1) Manufacturers documentation:
    - a) Manufacturer's product literature for each item.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. See submittal requirements as specified in Section 04 0501.
- B. Storage And Handling Requirements:
  - 1. See submittal requirements as specified in Section 04 0501.

#### 1.5 WARRANTY

A. Manufacturer's Standard Warranty for products provided.

#### PART 2 - PRODUCTS

#### 2.1 ACCESSORIES

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Advanced Building Products Inc, Springvale, ME www.advancedflashing.com.
    - b. Hohmann & Barnard, Haupauge, NY www.h-b.com.
    - c. Mortar Net USA Ltd, Burns Harbor, IN www.mortarnet.com.
    - d. Sandell Manufacturing, Schenectady, NY www.sandellmfg.com.
    - e. Wire-Bond, Charlotte, NC www.wirebond.com.
    - f. York Manufacturing Inc, Sanford, ME www.yorkflashings.com.

# B. Materials:

- 1. Flexible Flashing:
  - a. Design Criteria:
    - 1) General:
      - a) Compatible with sealants and other building components.
      - b) Do not use as an exposed flashing.
      - c) Drool: Membrane shall not 'drool' when exposed to UV or heat.
    - 2) Required Components:
      - a) Drip Edge/Plate: Install with stainless steel drip edge/plate.
      - b) Mortar Guard: Install with mortar guard.
      - c) Termination Bar: Install termination bar.
      - d) Weep Vents: Requires weep vents.
    - 3) Self-adhering and self-sealing membranes:
      - a) Ambient Conditions: Follow Manufacturer recommendations for storage and application.
      - b) Do not apply to moist or damp surfaces.
      - c) Meet testing requirements of ASTM D903 for peel or stripping strength of adhesive bonds.
  - b. Asphalt-Free Copper Flashing:
    - 1) Description:
      - a) Non-asphaltic laminated flashing.
      - b) Copper bonded laminated with a non-asphaltic adhesive compound.
      - s) Size: 5 ounces copper per one sq ft of material.
    - 2) Type One Acceptable Products:
      - a) Cop-R-Kraft Duplex by Advanced Building Products.
      - b) Copper-Tuff by Hohmann & Barnard.
      - Cop-R-Tex Duplex (for coping, door and window heads, roof flashing, curtain wall and flashing between new and old walls) by York.
      - d) Multi-Flash 500 by York.
      - e) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.

- c. Asphalt-Free Non-Copper Flashing:
  - 1) Description:
    - a) Self-adhering and self-sealing composite non-asphaltic waterproof polyethylene membrane.
  - 2) Design Criteria:
    - Self-adhering and self-sealing.
    - b) Width: Provide 18 inches minimum width.
  - 3) Type One Acceptable Products:
    - a) Aguaflash Premium by Wire-Bond.
    - Flex-Flash Flashing by Hohmann & Barnard.
    - c) Textroflash Flashing by Hohmann & Barnard.
    - d) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- d. Preassembled Systems:
  - 1) Description:
    - a) Pre-assembled panels consist of flashing membrane, drainage mat with integrated weep tabs, termination bar, drip edge, inside/outside corner boots, and end dams for a complete system.
  - 2) Type One Acceptable Product:
    - a) Total Flash by Mortar Net.
    - b) Flash-Vent by York.
    - c) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.

# 2. Components:

- a. Drip Edge/Plate:
  - 1) Design Criteria:
    - a) 26 ga (0.019) stainless steel AISI Type 304 drip edge/plate flashing with drip edge hemmed back.
  - 2) Type One Acceptable Products:
    - a) No. 1007 Hemmed Drip-Edge Flashing by Heckmann.
    - b) Drip Plate by Hohmann & Barnard.
    - c) Sandell's Drip Edge by Sandell Construction Solutions.
    - d) No. 4156 Drip Edge Flashing by Wire-Bond.
    - e) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- b. Mortar Guard:
  - 1) Description:
    - Allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
  - 2) Design Criteria:
    - a) Allows moisture to quickly and easily exit the cavity.
    - b) Allows for proper air movement in and out of the cavity.
    - c) Will not oxidize, rot, promote mold or fungus growth, or react with common building materials.
  - 3) Dimensions:
    - a) Thickness as recommended by Manufacturer for air space.
  - 4) Category Four Approved Products. See Section 01 6200 for definition of Categories.
    - a) Mortar Trap by Hohmann & Barnard.
    - b) Mortar Net by Mortar Net.
- c. Termination Bar:
  - 1) Design Criteria:
    - a) Rigid PVC or stainless steel bar with sealant catch lip.
  - 2) Class Two Quality Standard:
    - Equal meeting Design Criteria as approved by Architect before installation. See Section 01 6200.
- d. Weep Vents:
  - 1) Description:
    - Allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
    - b) Dimensions:
      - (1) 3/8 inch wide x 2-1/2 inch deep x 3-3/8 inch long.
  - 2) Design Criteria:
    - a) Polypropylene tested to conform to ASTM standards.
    - b) Suitable for top of wall venting.
  - 3) Type One Acceptable Products:
    - a) Cell Vent:
      - (1) QV Quadro-Vent by Hohmann & Barnard.
      - (2) No. 3601 Cell Vent by Wire-Bond.
    - Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.

- e. Vents (Open Head Joints):
  - 1) Description:
    - a) Vent inserted in weep hole at top of drainage air space in full height masonry veneer walls (not required in veneer wainscot walls or if air space vents into structure/roof above wall).
    - Vent allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
    - c) Dimensions:
      - (1) 3/8 inch wide x 2-1/2 inch deep x 3-3/8 inch long.
  - 2) Design Criteria:
    - a) Polypropylene tested to conform to ASTM standards.
    - b) Suitable for top of wall venting.
  - 3) Type One Acceptable Products:
    - a) Cell Vent:
      - (1) QV Quadro-Vent by Hohmann & Barnard.
      - (2) No. 3601 Cell Vent by Wire-Bond.
    - b) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- 3. Masonry Control Joints (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
  - a. As specified in Section 04 0501: 'Common Masonry Requirements':
- 4. Masonry Expansion Joints: (Brick Unit Masonry)
  - a. As specified in Section 04 0501: 'Common Masonry Requirements'.
- 5. Precast Concrete Wall Cap Flashing:
  - a. Description:
    - 1) Prevent entry of water into top of masonry wall located under precast concrete cap.
  - b. Design Criteria:
    - 26 ga (0.019) stainless steel AISI Type 304 drip edge/plate flashing with drip edge hemmed back.
    - 2) Apply sealant and backing rod.
  - c. Type One Acceptable Products:
    - 1) No. 1007 Hemmed Drip-Edge Flashing by Heckmann.
    - 2) Drip Plate by Hohmann & Barnard.
    - 3) Sandell's Drip Edge by Sandell Construction Solutions.
    - 4) No. 4156 Drip Edge Flashing by Wire-Bond.
    - 5) Equal meeting Design Criteria as approved by Architect.

PART 3 - EXECUTION: Not Used

END OF SECTION

MASONRY ACCESSORIES - 4 - 04 0523

# SECTION 04 2113 BRICK VENEER UNIT MASONRY

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install masonry units as veneer on framing as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Engraved Stone Panel Signage.
  - 2. Masonry Accessories:
    - a. Drip edge/plate.
    - b. Flexible flashing for brick sills.
    - c. Flexible flashing for bottom of masonry veneer.
    - d. Mortar guard.
    - e. Termination bar.
    - f. Weep vents.
  - 3. Masonry Veneer Ties.
  - 4. Metal Lintels.
  - 5. Reglets.

# C. Related Requirements:

- 1. Sections Under 04 0000 Heading: 'Masonry':
  - a. Pre-installation conference held jointly with other masonry related sections.
- 2. Section 04 0501: 'Common Masonry Requirements' for:
  - a. Common masonry requirements and procedures.
  - b. Pre-installation conference held jointly with other masonry related sections.
- 3. Section 04 0513: 'Cement and Lime Masonry Mortaring' for quality of mortar.
- 4. Section 04 0521: 'Masonry Veneer Ties' for quality of masonry veneer ties.
- Section 04 0523: 'Masonry Accessories' for furnishing drip edge/plate, flexible flashing, mortar guard, termination bars and weep vents.
- 6. Section 05 1223: 'Structural Steel for Buildings' for metal lintels.
- 7. Section 07 7126: 'Reglets'.
- 8. Section 07 9213: 'Elastomeric Joint Sealants'.
- 9. Section 10 1424: 'Engraved Stone Panel Signage'.

# 1.2 REFERENCES

- A. Definitions
  - 1. Section 04 0501: 'Common Masonry Requirements' for:
    - a. Common Masonry Terms.
    - b. Brick and Brick Classifications.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C67-14, 'Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile'.
    - b. ASTM C216-16, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale)'.
  - 2. Masonry Standards Joint Committee (MSJC) The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
    - a. TMS 402-13/ACI 530-13/ASCE 5-13 and TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Building Code Requirements and Specification for Masonry Structures'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.
    - a. Schedule pre-installation conference during construction of mockup panel.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. One (1) full size brick minimum, one (1) sample of each special shape, and physical samples which demonstrate full range of color and texture.
    - b. Type of veneer tie used.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Brick Manufacturer's literature or cut sheet.
        - b) Brick color and type selection.
      - 2) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum of five (5) years' experience on successfully completed projects of similar nature.
- B. Testing And Inspection:
  - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- C. Mockups:
  - 1. Sample panel 4 feet long by 3 feet high of proposed color range, texture, bond, mortar, and workmanship. Include mock-up framing and sheathing to show wall construction to be used on Project, including:
    - a. Anchor and tie systems.
    - b. Any specialty details, such as reveals, soldier courses, window details and etc.
    - c. Brick expansion joints if required on Project.
    - d. Flexible flashing and required components at foundation.
    - e. Seismic reinforcing.
  - 2. Sample panel(s) shall be constructed using 'production run' material to be used on Project unless otherwise approved in writing by Architect and/or Owner.
  - 3. Sample panel(s) to be used as standard of comparison for masonry work built of same material.
  - 4. Sample panel(s) shall remain at jobsite until all masonry is completed.
  - 5. Do not start work of this Section until Architect has accepted sample panel(s).

# 1.6 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
  - 1. Aggregate, Cementitious Material, Masonry Accessories, Masonry Units, and Reinforcement:
    - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Cold Weather and Hot Weather Limitations:
    - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Design Criteria:
  - 1. Face Brick: Meet requirements of ASTM C216 or CSA A82.
    - a. Brick Grade SW.
    - b. Brick Type: FBX.
    - c. Efflorescence:
      - 1) Provide brick that has been tested according to ASTM C67 and is rated 'Not Effloresced'.
    - d. Initial rate of absorption: Less than 30 sq. in per minute when tested per ASTM C67.
    - e. Brick shall be free of defects, deficiencies, and surface treatments, including coatings that would interfere with proper setting of brick or significantly impair strength or performance of Work.
    - f. Face or faces that will be exposed in place shall be free of chips that exceed limits set in ASTM C216 of five (5) percent for FBX. Aggregate length of chips shall not exceed ten (10) percent.
    - g. Other than chips, face or faces shall be free of cracks or other imperfections detracting from appearance of designated sample when viewed from distance of 15 feet away. Number of brick in delivery that are broken or otherwise fail to meet requirements for chippage and tolerances shall not exceed five (5) percent.
  - 2. Brick shall be cleanable using standard method specified below when using specified mortar.

#### B. Materials:

- 1. Mortar (as specified in Section 04 0513: 'Cement And Lime Masonry Mortaring'):
  - a. Type 'N' preferred for unit masonry three stories or less. Use Type 'S' if unit masonry is over three stories.
- 2. Brick:
  - a. Brick shall be true to size and shape. No warped brick permitted. Brick for Project shall be fired in same
  - b. 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long modular brick.
  - c. Type One Acceptable Manufacturers, Style, And Color:
    - Brick Type A;
      - a) Interstate Smokey Mountain Matte Texture.
      - b) Equal as approved by Architect before bidding. See Section 01 6200.
    - 2) Brick Type B;
      - a) Interstate Smokey Mountain Ruff.
      - b) Equal as approved by Architect before bidding. See Section 01 6200.

### 2.2 ACCESSORIES

- A. Cleaning Compounds:
  - 1. Use type of compound recommended by Brick Manufacturer based on minerals present in masonry units.
  - 2. Type Two Acceptable Products:
    - a. 202 or 202V by Diedrich Technologies, Oak Creek, WI www.diedrichtechnologies.com.
    - b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc. Kansas City, KS www.prosoco.com.
    - c. Equal as approved by Architect before use. See Section 01 6200.

# PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify substrate is suitable for installation of masonry.
  - 2. Verify built-in items are in proper location, and ready for roughing into masonry.

- 3. Notify Architect of unsuitable conditions in writing.
  - a. Do not install masonry over unsuitable conditions.
  - b. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 PREPARATION

A. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.

#### B. Clean:

- 1. Prior to placing masonry:
  - a. Clean reinforcement and shanks of anchor bolts by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.
  - b. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.

# 3.3 INSTALLATION

- A. Interface With Other Work:
  - Masonry Cutting:
    - a. Make cuts proper size to accommodate work of other trades.
    - b. Cut openings for electrical devices using cover plates no larger than can be covered by standard size plate.
    - c. Replace unit masonry in which larger than necessary openings are cut.
    - d. Do not patch openings with mortar or other material.

#### B. General:

- 1. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- 2. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- Built-In Work:
  - As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.

# C. Mortar:

- 1. Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set. Set masonry units within one (1) minute of spreading mortar.
- 2. Do not allow mortar build-up in cavity between brick veneer and wall framing.
- 3. Cold Weather and Hot Weather Limitations:
  - a. Place mortar as specified in Section 04 0501: 'Common Masonry Requirements'.

#### D. Tolerances:

- Masonry shall be laid true to vertical and horizontal planes within 1/8 inch in 10 feet, non-cumulative. Recess masonry where indicated.
- 2. Maintain 3/8 inch mortar joints throughout.

# E. Brick Masonry Units:

- 1. Laying:
  - a. Layout:
    - 1) Running bond except where noted otherwise. Select brick so there is uniform distribution of hues.
    - 2) Use solid brick where brick coursing would otherwise show cores.
  - b. Joints:
    - 1) Do not tool until mortar has taken initial set.
    - 2) Tool concave. When tooling joints, squeeze mortar back into joint.
    - 3) Point holes in joints. Fill and tool properly.
  - c. Brick:
    - Wet each brick to saturation. Lay brick when surface is dry. Brick absorption when laid should not exceed0.025 oz/sq inch maximum.
    - 2) Shove brick into place in full mortar bed, do not lay.
    - 3) Completely fill horizontal and vertical joints. Do not furrow bed joints.
    - Strike back-side joints on brick flush. Do not allow mortar build-up in cavity between masonry veneer and stud wall sheathing.

- 5) Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- 2. Placing Mortar:
  - a. General:
    - 1) Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set.
    - 2) Set masonry units within one (1) minute of spreading mortar.
  - b. Bed joints at foundations:
    - 1) In starting course on foundations and other supporting members, construct bed joints so that bed joint thickness is at least 1/4 inch and not more than:
      - 3/4 inch when masonry is ungrouted or partially grouted.
      - b) 1-1/4 inch when first course of masonry is solid grouted and supported by concrete foundation.
  - c. Bed and head joints:
    - 1) Unless otherwise required, construct 3/8 inch thick bed and head joints, except at foundation.
    - 2) Construct joints that also conform to following:
      - a) Fill holes not specified in exposed and below grade masonry with mortar.
      - b) Tool joint with round jointer when mortar is thumbprint hard.
      - c) Remove masonry protrusions extending 1/2 inch or more into cells or cavities to be grouted.
  - d. Solid units:
    - 1) Unless otherwise required, place mortar so that bed and head joints are fully mortared and:
      - a) Do not fill head joints by slushing with mortar.
      - b) Construct head joints by shoving mortar tight against adjoining unit.
      - c) Do not deeply furrow bed joints.
  - e. Open end units with beveled ends:
    - 1) Fully grout open-end units with beveled ends.
    - 2) Head joints of open-end units with beveled ends need not be mortared:
      - a) At beveled ends, form grout key that permits grout within 5/8 inch of face of unit.
      - b) Tightly butt units to prevent leakage of grout.

# F. Masonry Veneer Ties:

- 1. Place corrugated sheet-metal anchors, sheet-metal anchors, and wire anchors as follows:
  - a. Free of material that may destroy bond.
  - b. Install in same course as masonry as brick reinforcement on centerline of brick width.
  - c. Install as detailed by screwing through sheathing into framing:
    - 1) Install as detailed by screwing through sheathing into framing.
    - 2) Begin approximately 8 inches from base of masonry and with maximum spacing of 16 inches vertically and at each vertical stud horizontally.
    - 3) Install final row of ties within 8 inches of top course of brick.
  - d. Provide at least one (1) adjustable two-piece anchor, anchor of wire size W 1.7 (MWII), or 22 ga corrugated sheet-metal anchor for each 2.67 sq ft of wall area.
    - 1) Provide at least one anchor of other types for each 3.5 sq ft of wall area.
  - e. Space anchors at maximum of 32 inches horizontally and 25 inches vertically, but not to exceed applicable requirement of as specified in two previous paragraphs.
  - f. Provide additional anchors around openings larger than 16 inch in either dimension:
    - 1) Space anchors around perimeter of opening at maximum of 3 feet on center.
    - 2) Place anchors within 12 inch of opening.
- 2. Seismic Reinforcing:
  - a. Install in same course as masonry ties on centerline of brick width.
  - b. Attach reinforcing to ties in accordance with Manufacturer's instructions.
  - c. Lap ends of horizontal joint reinforcing 8 inches at joints.

#### G. Flashing:

- 1. General:
  - a. Install embedded flashing, metal drip edges, with weep holes and other components in masonry at lintels, ledges, floors, and other obstructions to downward flow of water in wall, and where indicated.
  - b. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
- Flexible flashing:
  - a. Install embedded flashing behind lower edge of air infiltration barrier.
  - b. Carry flashing vertically as detailed, but not less than 6 inch above horizontal plane.
  - c. Lap flexible flashing minimum of 6 inch
  - d. Seal all flashing laps with compatible lap cement.
  - e. Install flashing with sealant between flashing and drip edge/plate.

- f. Do not stop flashing behind face of brickwork.
- g. Place flashing at all points where air space is interrupted.
- h. Extend head flashings no less than 6 inch beyond edges of openings and turn up to form watertight pan, seal with mastic.
- i. Extend sill flashings no less than 8 inch minimum height to form watertight pan, seal with mastic.
- j. All discontinuous flashing shall be turned up minimum 1 inch into head joint a flashing ends to form an end dam.
- 3. Drip edge/plate: Install with sealant (or equal) between drip edge/plate and substrate.
- 4. Termination bar: Install termination bar with sealant.

### H. Weep Holes:

- 1. General:
  - a. Weep holes must be placed at base of cavity and at all other flashing levels providing means of draining away any moisture that may have found its way into cavity.
  - b. Weep holes must provide clear access to cavity and must be placed directly on flashing for proper drainage.
- 2. Install weep vents in weep holes at 33 inches on center maximum at bottom masonry course at foundation and above windows and doors where brick veneer occurs.

# I. Vents (Open Head Joints):

- 1. Place vents at top of cavity air space of full height masonry walls.
- 2. Install weep vents in weep holes at 33 inches on center maximum and should be centered between weep holes at base of Masonry wall.

#### J. Mortar Guard:

1. Place mortar guard continuously between brick and sheathing at bottom masonry course at foundation and above windows, and doors where brick veneer occurs.

#### K. Expansion Joints:

- 1. Unit Masonry:
  - a. See Contract Drawings if required):
    - 1) Keep clean of all mortar and debris.
    - 2) Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
    - 3) Provide vertical joints where indicated by inserting compressible filler of width required for installing backer rod and sealant specified in section 07 9213: 'Elastomeric Joint Sealants', but not less than 3/8 inch.

# 3.4 CLEANING

#### A. General:

- 1. Clean exposed masonry surfaces of stains, efflorescence, mortar and grout droppings, and debris using methods that do not damage masonry
- 2. After mortar has hardened, wet masonry and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.
- 3. Wash adjacent non-masonry surfaces. Use detergent and soft brushes or cloth.
- 4. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

#### B. Waste Management:

1. Clean up masonry debris and remove from site.

# 3.5 PROTECTION

#### A. General:

- 1. During construction, all walls should be kept dry by covering top of wall with a strong, water-resistant membrane at end of each day or shutdown period. Covering should overhang wall by at least 24 inches on each side, and should be secured against wind.
- 2. Covering should remain in place until top of cavity wall is completed or protected by adjacent materials.
- 3. Protect masonry with covering during rainy weather.

- B. Cold Weather Requirements:
  - 1. In cold weather, all materials and walls should be properly protected against freezing including storing of materials, preparation of mortar, heating of masonry units, laying precautions, and protection of Work.
  - 2. Remove all masonry deemed frozen or damaged.
- C. Stain prevention: Prevent grout, mortar, and soil from staining face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.
  - Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with pointed and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

END OF SECTION

# SECTION 04 2724 CAVITY WALL UNIT MASONRY: Enclosure Walls

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install cavity wall unit masonry as described in Contract Documents for:
    - a. Mechanical Equipment Enclosure Walls.
    - b. Dumpster Enclosure Walls.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Brick veneer.
  - 2. Precast concrete wall cap.
  - 3. Masonry Accessories.
- C. Related Requirements:
  - 1. Section 03 4800: 'Precast Concrete Specialties' for precast concrete wall caps.
  - 2. Section 04 0501: 'Common Masonry Requirements' for:
    - a. Common masonry requirements and procedures.
    - b. Pre-installation conference held jointly with other masonry related sections.
  - 3. Section 04 0513: 'Cement and Lime Masonry Mortaring' for quality of mortar.
  - 4. Section 04 0516: 'Masonry Grouting' for quality of grout.
  - 5. Section 04 0519: 'Masonry Anchors and Inserts' for anchor bolts used in masonry.
  - 6. Section 04 0520: 'Masonry Reinforcing' for quality of masonry reinforcing.
  - 7. Section 04 0523: 'Masonry Accessories' for drip edge/plate, flexible flashing, weep vents, and wall cap flashing.
  - 8. Section 04 2113: 'Brick Veneer Masonry'.
  - 9. Section 10 1424: 'Engraved Stone Panel Signage'.

### 1.2 REFERENCES

- A. Definitions:
  - 1. Section 04 0501: 'Common Masonry Requirements' for:
    - a. Common Masonry Terms.
    - b. Brick and Brick Classifications.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C90-16, 'Standard Specification for Loadbearing Concrete Masonry Units'.
    - b. ASTM C216-14, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale)'.
    - c. ASTM C331/C331M-14, 'Standard Specification for Lightweight Aggregates for Concrete Masonry Units'.
    - d. ASTM C476-16, 'Standard Specification for Grout for Masonry'.
  - 2. Masonry Standards Joint Committee (MSJC) The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
    - a. TMS 402-13/ACI 530-13/ASCE 5-13 and TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Building Code Requirements and Specification for Masonry Structures'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples: As required in Section 04 2113.
- B. Informational Submittals:
  - Manufacturer Report:
    - a. Certification that CMU meets specified compressive strength requirements.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Brick Manufacturer's literature or cut sheet.
        - b) Brick color and type selection.

# 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. As specified in 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
  - 1. Aggregate, Cementitious Material, Masonry Accessories, Masonry Units, and Reinforcement:
    - a. As specified in 04 0501: 'Common Masonry Requirements'.

#### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Cold Weather and Hot Weather Limitations:
    - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

# PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Materials:
  - 1. Mortar: Type 'N' as specified in Section 04 0513: 'Cement and Lime Masonry Mortaring'.
  - 2. Grout:
    - a. Proportions of Ingredients:
      - 1) Grout proportions shall be determined by one of following methods:
        - a) As per ASTM C476 Table 1: 'Grout proportions by Volume' for fine and coarse grout.
        - b) Specified Compressive Strength: Proportions established by twenty-eight (28) day compressive strength tests in accordance with Test Method ASTM C1019 that obtain specified compressive strength:
          - Grout shall be mixed to slump of 8 to 11 inches as determined by Test Method ASTM C143/C143M and shall have minimum compressive strength of 2000 psi at 28 days.
  - 3. Concrete Masonry Units:
    - a. Design Criteria:
      - 1) Meet requirements of ASTM C90, lightweight classification:
        - a) 85 lbs per cu ft minimum weight classification.
        - b) Lightweight aggregates conforming to ASTM C331/C331M.
        - c) Do not use re-crushed masonry units as aggregate.
        - Outside Corners: Square-edged, except where bull nose is indicated on Drawings.
      - Uniform color and textures with unbroken edges. Smooth face, except where shown otherwise on Drawings.
  - 4. Brick:
    - a. Design Criteria:
      - 1) As specified in Section 04 2113: Brick Veneer Unit Masonry'.

#### 2.2 ACCESSORIES

- A. Cleaning Compounds:
  - 1. Use type of compound recommended by Brick Manufacturer based on minerals present in masonry units.
  - 2. Type Two Acceptable Products:
    - a. 202 or 202V by Diedrich Technologies, Oak Creek, WI www.diedrichtechnologies.com.
    - b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc, Kansas City, KS www.prosoco.com.
    - c. Equal as approved by Architect before use. See Section 01 6200.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify substrates have been properly prepared.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install masonry over unsuitable conditions.
    - b. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 PREPARATION

- A. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.
- B. Prior to placing masonry:
  - Clean reinforcement by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.
  - 2. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.
- C. Wetting Masonry Units:
  - 1. Concrete masonry:
    - a. Do not wet concrete masonry units before laying. Wet cutting is permitted.
- D. Reinforcement:
  - 1. Place reinforcement and ties in grout spaces prior to grouting.

# 3.3 INSTALLATION

- A. General:
  - 1. Cold Weather and Hot Weather Limitations:
    - a. Place grout and mortar as specified in Section 04 0501: 'Common Masonry Requirements'.
  - 2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
  - 3. Make cuts proper size to accommodate work of other trades.
  - 4. Built-In Work:
    - As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.
- B. Tolerances:
  - 1. Masonry work shall be true to vertical and horizontal planes within 1/8 inch in 10 feet, non-cumulative.
  - 2. Maintain 3/8 inch mortar joints throughout.
- C. Flashing:
  - 1. General:
    - Install embedded flashing, metal drip edges, with weep holes and other components in masonry at base of wall.
    - b. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place flashing on sloping bed of mortar and cover with mortar. Before

covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

- 2. Drip edge/plate: Install with sealant (or equal) between drip edge/plate and substrate.
- 3. Through-wall (flexible) flashing:
  - a. Lap flexible flashing minimum of 6 inch
  - b. Seal all flashing laps with compatible lap cement.
  - c. Install flashing with sealant between flashing and drip edge/plate.
  - d. Flashing should be securely fastened to interior wythe and extend through face of exterior brick wythe.
  - e. Flashing should be turned up at least 8 inch and embedded in inner wythe.
  - f. Flashing should be carefully installed with no punctures or tears.
  - g. Where flashing is required to be lapped, ends of flashing should be overlapped a minimum of 6 inch and laps properly sealed to avoid water running between the sections.

#### D. Mortar:

- 1. Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set. Set masonry units within one (1) minute of spreading mortar.
- 2. Do not allow mortar build-up in cavity between brick veneer and Concrete Masonry Units (CMU).

#### E. Mortar Guard:

1. Place mortar guard continuously between brick and CMU at bottom masonry course at foundation.

#### F. Grouting:

- 1. General:
  - a. Provide grout that conforms to requirements as specified in Section 04 0516: 'Masonry Grouting'.
  - b. Confine grout to areas indicated on Contract Drawings. Use material to confine grout that permits bond between masonry units and mortar.
- 2. Concrete Masonry Units:
  - a. Fully grout masonry enclosure walls.
    - 1) Place grout in 48 inch maximum lifts.
    - 2) Consolidate grout by means of mechanical vibrator. Do not use cell reinforcing to rod grout.
    - 3) Before loss of plasticity, mechanically reconsolidate grout.
    - 4) If placement of grout is stopped for one hour or longer, provide horizontal construction joints by stopping grout at least 1.1/2 inches below top of the course of block.
- 3. Do not grout space between wythes of masonry.

# G. Laying:

- 1. Layout:
  - a. Running bond except where indicated otherwise.
  - b. Select brick so there is uniform distribution of hues.
  - c. Use solid brick where brick coursing would otherwise show cores.
- 2. Joints:
  - a. Tool concave. Fill completely except where indicated differently.
  - b. Do not tool until mortar has taken initial set.
  - c. Point holes in joints. Fill and tool properly.
- 3. Concrete Masonry Units:
  - a. Lay hollow masonry units dry. Do not lay masonry on frozen material.
  - b. Place hollow units so:
    - 1) Face shells of bed joints are fully mortared.
    - 2) Webs are fully mortared in all courses.
    - 3) Head joints are mortared, minimum distance from each face equal to face shell thickness of unit.
    - 4) Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with Contract Drawings.
  - c. Align cells or cavities to preserve an unobstructed cavity for grouting installed in cells:
  - d. Full bedding required on both webs and face shell under first course. Other courses need only face shell bedding except where bedding is needed to control flow of grout.
- 4. Brick Masonry Units:
  - a. Wet each brick to saturation. Lay brick when surface is dry. Brick absorption when laid should not exceed 0.025 oz per sq maximum.
  - b. Shove brick into place in full mortar bed, do not lay.
  - c. Completely fill horizontal and vertical joints. Do not furrow bed joints.
  - d. Strike backside joints on brick flush. Do not allow mortar build-up in cavity between brick veneer and Concrete Masonry Units.

#### 5. Weep Holes:

- a. General:
  - 1) Weep holes must be placed at base of cavity and at all other flashing levels providing means of draining away any moisture that may have found its way into cavity.
  - Weep holes must provide clear access to cavity and must be placed directly on flashing for proper drainage.
- b. Install weep vents in weep holes at 33 inches on center maximum at bottom masonry course at foundation.

#### H. Reinforcing:

- 1. Reinforcing shall be free of material that may destroy bond.
- 2. Continuous Joint Reinforcing:
  - a. Beginning approximately 8 inches from base of masonry, provide joint reinforcing 16 inches on center vertically, except 8 inches on center if drip crimped.
  - b. Maximum offset between brick and block coursing is 1-1/4 inch using ladder adjustable-wire reinforcement or ladder adjustable-wire reinforcement with seismic hook type reinforcing. If brick and block coursing is exactly lined up, ladder adjustable-wire reinforcing may be used. However, such reinforcing may not be bent to fit coursing that does not line up.
  - c. Lap splices and intersections minimum of 6 inches.
- 3. Masonry Reinforcing Steel:
  - a. Place steel as shown on Contract Drawings.
  - b. Splice 48 bar diameters minimum.
  - c. Place reinforcing and dowels before pouring grout.
  - d. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
  - e. Place horizontal bars in 8 inch deep bond beam units at top of wall and at 48 inches on center between. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections.
  - f. Place special vertical bars of same size as normal vertical reinforcement at corners and jambs of openings and recesses where bond beams are interrupted and at beam bearing locations not otherwise detailed.
  - g. Unless detailed otherwise, place special horizontal bars of same size as normal reinforcing above and below openings. Extend bars 24 inches minimum beyond opening.

## 3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Tests and inspections are not required for masonry materials in enclosure walls.
- B. Non-Conforming Work:
  - 1. Remove and replace defective material at Architect's direction and at no additional cost to Owner.

## 3.5 CLEANING

## A. General:

- 1. Clean exposed masonry surfaces of stains, efflorescence, mortar and grout droppings, and debris using methods that do not damage masonry.
- 2. After mortar has hardened, wet masonry and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.
- 3. Wash adjacent non-masonry surfaces. Use detergent and soft brushes or cloth.
- 4. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

# B. Waste Management:

- 1. Unit Masonry:
  - a. Clean up masonry debris and remove from site.

# 3.1 PROTECTION

#### A. General:

- 1. Brace masonry walls until walls attain adequate strength and are tied into building structure.
- 2. Do not allow structural loading of masonry walls until walls attain adequate strength.

- 3. During construction, all walls should be kept dry by covering top of wall with strong, water-resistant membrane at end of each day or shutdown period. Covering should overhang wall by at least 24 inches on each side, and should be secured against wind.
- 4. Covering should remain in place until top of cavity wall is completed or protected by adjacent materials.
- 5. Protect masonry with covering during rainy weather.
- B. Cold Weather Requirements:
  - 1. In cold weather, all materials and walls should be properly protected against freezing including storing of materials, preparation of mortar, heating of masonry units, laying precautions, and protection of Work.
  - 2. Remove all masonry deemed frozen or damaged.
- C. Stain prevention: Prevent grout, mortar, and soil from staining face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.
  - Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with pointed and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# DIVISION 5 - METALS:

DIVIDIOIO	IVIL IT ILO.
05 0000	Metals
05 0503	Shop-Applied Metal Coatings
05 0523	Metal Fastenings
05 1000	Structural Metal Framing
05 1223	Structural Steel for Buildings
05 5000	Metal Fabrications
05 5133	Wall-Mounted Ladder
05 5214	Steel Pipe and Tube Railings
05 5215	Stainless Steel Handrails
05 5871	Metal Brackets

DIVISION 05 METALS

# SECTION 05 0503 SHOP-APPLIED METAL COATINGS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of factory or shop-applied priming applied to steel supplied to Project without finish coat.
  - 2. Quality of and procedures for field touch-up and repair of factory-applied priming and galvanizing.
  - 3. Quality of and procedures for shop-applied finish applied to steel supplied to Project for Steeple Base Support as described in contract documents.
- B. Related Requirements:
  - 1. Sections under 09 9000 heading: Finish painting.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A780/A780M-09(2015), 'Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings'.
    - b. ASTM B695-04(2016), 'Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference.
  - 2. In addition to requirements of Section 01 3100, review following:
    - a. Meet with Architect before commencing repair of galvanized surfaces to establish extent of repairs required and, if applicable, choice of methods to be used.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Product data and samples, if requested by Architect.

# PART 2 - PRODUCTS

#### 2.1 FINISHES

- A. Factory And Shop-Applied Primer:
  - Compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.
  - 2. Primer on unexposed, unfinished surfaces may be fabricator's standard shop coat.
- B. Repairs To Primed Surface:
- C. Unless otherwise specified, use primer which matches characteristics of original primer and is compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.

- D. Material For Repairs Of Galvanized Surfaces:
  - 1. Non-Structural, Non-Load-Bearing Items Not Exposed To Weather:
    - a. Zinc-Rich Paints:
      - 1) Zinc-Dust Content: Dried film shall contain 94 percent minimum of zinc-dust by weight.
      - 2) Type One Acceptable Manufacturers:
        - a) Galvax by Alvin Products Inc, Everett, MA www.alvinproducts.com.
        - b) ZRC Galvilite by ZRC Worldwide, Marshfield, MA www.zrcworldwide.com.
        - c) Equal as approved by Architect before bidding. See Section 01 6200.
  - 2. Structural, Load-Bearing Items And Items Exposed To Weather:
    - a. Zinc-Based Solders, Powder, Or Rod:
      - Zinc-Cadmium solder with liquidus temperature range from 518 to 527 deg F, or
      - 2) Zinc-Tin-Lead alloy with liquidus temperature range from 446 to 500 deg F.
    - b. Sprayed Zinc: Wire, ribbon, or powdered zinc suitable for process.

#### E. Steeple Base Support:

- 1. Finish:
  - a. Corlar 2.1-ST satin high solids epoxy mastic by Dupont Industrial Coatings.
    - 1) Thickness: Apply 10 mils thick.
  - b. Type One Acceptable Manufacturers:
    - 1) Dupont Industrial Coatings, Wilmington, DE www.dupont.com.
    - 2) Equal as approved by Architect before bidding. See Section 01 6200.

#### PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Surface Preparation:
  - General:
    - Clean, grind, or otherwise prepare welds in steel that is to be coated within limits acceptable to welder responsible for structural integrity.
    - b. Surfaces to be coated shall be clean, dry and free of oil, grease, and corrosion products.
  - 2. Preparation Of Primed, Ungalvanized Surfaces:
    - a. Clean welds and grind serious abrasions.
  - 3. Preparation Of Galvanized Surfaces:
    - a. Follow requirements of ASTM A780/A780M and following:
    - b. For Repair Using Zinc-Rich Paints:
      - Blast clean surfaces to near-white metal, in accordance with SSPC-SP10 (1 to 2 mil anchor pattern), as minimum.
      - 2) Where circumstances do not allow blast cleaning, power disk sand to bright metal finish.
      - 3) Extend surface preparation into undamaged galvanized area.
      - 4) Remove flux residue and weld spatter from welded areas.
    - c. For Repair Using Zinc-Based Alloys:
      - 1) Clean surface to be reconditioned using wire brush, light grinding action, or mild blasting.
      - 2) Extend surface preparation into surrounding, undamaged galvanized areas.
      - 3) Remove flux residue and weld spatter from welded areas.
      - 4) Preheat cleaned area to at least 600 deg F.
        - Do not overheat surface beyond 750 deg F or allow surrounding galvanized coatings to be burned
        - b) Wire brush surface during preheating.
    - d. For Repair Using Sprayed Zinc (Metallizing):
      - 1) Blast clean surfaces to near-white metal, in accordance with SSPC-SP5 as minimum.
      - 2) Extend surface preparation into undamaged galvanized area.
      - 3) Remove flux residue and weld spatter from welded areas.

# 3.2 REPAIR / RESTORATION

- A. Repairs To Primed, Ungalvanized Surfaces:
  - 1. Thoroughly clean metal and give one (1) prime coat of specified material, well-worked into metal joints and open spaces. Match existing primed finish as required.

- a. Do not apply primer at temperatures below 45 deg F.
- b. Protect un-primed machine-finished surfaces against corrosion by priming.

# B. Repairs To Galvanized Surfaces:

- 1. Non-Structural, Non-Load-Bearing Items Not Exposed To Weather:
  - a. Repair Using Zinc-Rich Paints: Spray- or brush-apply zinc-rich paint to prepared area. Apply paint in single application employing multiple spray passes to achieve dry film thickness of 2 mils.
- 2. Structural, Load-Bearing Items And Items Exposed To Weather:
  - a. Repair Using Zinc-Based Alloys:
    - Rub cleaned, pre-heated areas with repair stick to deposit evenly distributed layer of zinc alloy. If powdered zinc alloys are used, sprinkle powder on surface and spread out with spatula or similar tool.
    - 2) Remove flux residue by rinsing with water or wiping with damp cloth.
  - b. Repair Using Sprayed Zinc (Metallizing): Apply 2 mil minimum coating by means of metal-spraying pistols fed with either zinc wire or zinc powder in accordance with requirements of ASTM B695, Type I.
- 3. All Items:
  - a. Apply repair materials immediately after surface preparation is complete.
  - Take thickness measurements, with either magnetic or electromagnetic gauge, to ensure applied coating is as specified or agreed to.

#### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Steeple Base:
    - a. Touch-up damaged coatings.

#### 3.4 PROTECTION

- A. Steeple Base:
  - 1. Protect finished coatings until completion of project.

# SECTION 05 0523 METAL FASTENING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of structural metal-to-metal, wood-to-metal, and wood-to-wood bolts used on Project.
  - 2. Requirements and standards for site welded metal-to-metal connections.
- B. Related Requirements:
  - 1. Section 03 1511: 'Concrete Anchors And Inserts' for cast-in-place and drilled-in anchor bolts.
  - 2. Furnishing and installing of structural bolts specified under Section concerned.
  - 3. Performance of welding specified under Section concerned.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American National Standards Institute / American Welding Society:
    - a. ANSI/AWS D1.1/D1.1M:2010, 'Structural Welding Code Steel'.
    - b. ANSI/AWS D1.3/D1.3M:2010, 'Structural Welding Code Sheet Steel'.
  - 2. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
    - b. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength'.

# 1.3 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to the following:
  - 1. Welders shall be certified 30 days minimum before beginning work on Project. If there is doubt as to proficiency of welder, Architect may require welder to take another test, at no expense to Owner. Certification shall be by Pittsburgh Laboratories or other authority approved by Architect.
- B. Certifications:
  - 1. Maintain welder's certifications on job-site.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Materials:
  - 1. Bolts And Threaded Fasteners:
    - a. Bolts: Conform to requirements of ASTM A307, Grade A.

#### 2.2 ACCESSORIES

A. Arc-Welding Electrodes: Type E70XX AWS Iron and Steel Arc-welding electrodes and meeting current AISC Specifications.

# PART 3 - EXECUTION

#### 3.1 **PERFORMANCE**

- Α. Welding shall meet requirements of ANSI / AWS D1.1 and D1.3.
- Minimum weld sizes, unless detailed otherwise.
  - Weld glu-lam connection side plates to base plates with 1/4 inch fillet weld all along outside edges. Weld stiffeners to pipe columns with 1/4 inch fillet weld all around.

END OF SECTION

METAL FASTENING - 2 -05 0523

# SECTION 05 1223 STRUCTURAL STEEL FOR BUILDINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Miscellaneous structural steel including following:
    - a. Lintels.
    - b. Rostrum Riser Handrail.
    - c. Structural pipe for bollards.

# B. Related Requirements:

- 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of bollards.
- 2. Sections under 04 2000 heading: Installation of lintels and miscellaneous structural steel.
- 3. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.
- 4. Section 05 0523: 'Metal Fastening' for quality of welding.
- 5. Section 05 5215: 'Stainless Steel Handrails' for Rostrum Riser Handrail stainless posts to be set into metal pipe sleeves.
- 6. Section 06 1100: 'Wood Framing' for installation of miscellaneous structural steel.
- 7. Section 09 9113: 'Exterior Painted Galvanized Metal' for preparing and painting new exterior exposed galvanized metal surfaces.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. American Society For Testing And Materials:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
    - b. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'
    - c. ASTM A500/A500M-13, 'Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes'.

## PART 2 - PRODUCTS

#### 2.1 COMPONENTS

# A. Materials:

- 1. Rostrum Riser Handrail Pipe Sleeves And Base Plates:
  - a. 2 inch diameter pipe sleeve welded to base plate. Allow 1/2 inch minimum of grout around perimeter of pipe. Field verify sleeve length.
  - b. Cap bottom of sleeve forming closure as shown on Contract Drawings.
  - 8 inchx16 inches x 1/4 inch steel base plate (expansion anchor bolts provide in Section 03 1511 'Concrete
    Anchors And Inserts').
- 2. Structural Pipe for Bollards.
  - a. Meet requirements of ASTM A53/A53M, Type E or S, Grade B.
    - 1) Weight Class, STD, Schedule 40.
- 3. Structural Tubing: Meet requirements of ASTM A500/A500M, Grade B.
- 4. Miscellaneous Steel:
  - a. Meet requirements of ASTM A36/A36M for the following:
    - 1) Miscellaneous structural steel.
    - 2) Lintels for exterior walls.

- B. Fabrication:
  - 1. After fabrication and before shop priming, hot-dip or mechanically galvanize to be installed in following:
    - a. Bollards.
    - b. Lintels in exterior walls.
  - 2. Shop prime steel provided under this Section.
- C. Finishes:
  - 1. Galvanized:
    - a. Galvanize finish for following:
      - 1) Bollards.
      - 2) Lintels in exterior walls.
    - b. See Section 09 9113 for preparing and painting new exterior exposed galvanized metal surfaces.
  - 2. Powder Coated:
    - a. Rostrum Riser Handrail Pipe Sleeves And Base Plates:
      - 1) Powder coated after complete fabrication:
        - a) Preparation:
          - (1) Meet ASTM standards for powder coating.
          - (2) Steel must be free of any scale, paint, varnish, grease, or rust.
          - (3) Chemical wash and rinse.
          - (4) Apply corrosion-inhibiting iron phosphate treatment.
        - b) Apply powder coating.
      - 2) Color: As selected by Owner from Manufacturers standard colors.

PART 3 - EXECUTION: Not Used

# SECTION 05 5133 VERTICAL METAL LADDERS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Metal Interior Ladders.
- B. Related Requirements:
  - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.
  - 2. Section 05 0523: 'Metal Fastening' for quality of welding.
  - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.
  - 4. Section 09 9124: 'Interior Painted Metal' for painting of interior ladders.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. American National Standards Institute/American Ladder Institute:
    - a. ANSI/ALI A14.3-2008, 'American National Standard for Ladders Fixed Safety Requirements'.
  - 2. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.

#### PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Materials:
  - 1. Steel For Interior Ladders: Meet requirements of ASTM A36/A36M.
  - 2. Stringers: 3/8 by 2-1/2 inch flat bar stock.
  - 3. Treads: One inch round rungs.
  - 4. Mounting Brackets: Drilled angles.

# B. Fabrication:

- 1. Fabricate ladders to comply with requirements of ANSI/ALI A14.3 including but not limited to:
  - a. Minimum requirements for design, construction, and use of fixed ladders.
  - b. Requirements for cages, wells, and ladder safety systems used with fixed ladders, in order to minimize personal injuries.
  - c. All parts and appurtenances necessary for safe and efficient ladder shall be considered integral parts of design.
- 2. Weld joints. Grind joints to be smooth to the touch and finished to match adjoining surfaces.
- 3. Space treads 12 inches on centers.
- 4. Fabricate mounting brackets of drilled angles.
- 5. Prime interior ladders.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Support ladder with welded steel brackets located at top and bottom, and equally spaced but no more than 60 inches on center between top and bottom where ladder is installed against a wall. Size brackets to support design loads specified in ANSI/ALI A14.3.

# SECTION 05 5214 STEEL PIPE AND TUBE RAILINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install interior steel pipe handrails as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming and repair of galvanizing.
  - 2. Section 05 0523: 'Metal Fastening' for quality of welding.
  - 3. Section 06 1100: 'Wood Framing' for blocking for handrail brackets installed on wood-framed walls.
  - 4. Finish painting:
    - a. Section 09 9124: 'Interior Painted Metal'.
  - 5. Section 10 2813: 'Commercial Toilet Accessories' for grab bars in Rest Rooms.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - ASTM A501/A501M-14, 'Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Show fabrication and installation of handrails and railings including floor plans, elevations, sections, details of components, and attachments to other elements of The Work.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, and protected against damage.
  - 2. Cover with waterproof paper, tarpaulin, or polyethylene sheeting. Allow for air circulation inside covering.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Materials:
  - Handrails
    - Steel pipe meeting requirements of ASTM A53/A53M or steel tubing meeting requirements of ASTM A501/A501M.
    - b. 1-1/2 inch outside diameter.
  - . Brackets, Flanges, Fittings, And Anchors:
    - Provide standard wall brackets, flanges, miscellaneous fittings, and anchors for connection of handrails to other construction.

#### B. Fabrication:

- 1. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly.
- 2. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- 3. Grind smooth welded joints and buff welds to same appearance as remainder of railing.
- 4. Form curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- 5. Welded Connections:
  - a. Fabricate railing system and handrail connections by welding.
  - b. Weld corners and seams continuously to comply with following:
    - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2) At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
    - 3) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and so contours of welded surfaces match adjacent surfaces.
- 6. Return pipe ends of wall mounted handrails into wall.
- 7. Cap pipe ends of floor / ground mounted handrails.
- 8. After fabrication, shop prime metal to be painted.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

A. Touch up field welds to match pre-finished material.

# SECTION 05 5215 STAINLESS STEEL HANDRAILS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install interior stainless steel pipe handrails as described in Contract Documents.
    - a. Handrails to Font.
    - b. Handrails to Platform.
  - 2. Furnish and install stainless steel handrails as described in Contract Documents:
    - a. Rostrum Riser Handrail.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchoring sleeves in concrete for stainless steel pipe handrails.
- C. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of anchoring sleeves cast into concrete.
  - 2. Section 05 0523: 'Metal Fastening' for quality of welding.
  - 3. Section 06 1100: 'Wood Framing' for blocking for pipe handrail brackets.
  - 4. Section 06 4115: 'Rostrum Casework' for wood handrail attached to Rostrum Riser Handrail.
  - 5. Section 10 2813: 'Commercial Toilet Accessories' for grab bars in Rest Rooms.
- D. Products Not Furnished And But Installed Under This Section:
  - 1. Pipe sleeves, base plates, and anchor bolts for Rostrum Riser Handrail.
- E. Related Requirements:
  - 1. Section 03 1511: 'Concrete Anchors And Bolts' for Rostrum Riser Handrail base plate expansion bolts as shown on Contract Drawings.
  - 2. Section 05 1223: 'Structural Steel For Buildings' for Rostrum Riser Handrail stainless posts to be set into metal pipe sleeves as shown on Contract Drawings.

# 1.2 REFERENCES

- A. Definitions:
  - 1. Non-shrink Grout: Structural grout used for filling voids between elements that is formulated with cement, fine aggregates and admixtures. Admixtures are used to provide expansive properties of the material during curing. This expansion counteracts the natural tendency of cement grouts to shrink during curing.
  - 2. Peened: Nonslip textured gripping surface that is much easier to hold on to.
  - 3. Stainless Steel Alloys:
    - a. Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C1107/C1107M-14, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Show fabrication and installation of handrails and railings including floor plans, elevations, sections, details of components, and attachments to other elements of The Work.

#### PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

# A. Materials:

- 1. Handrails And Railings:
  - a. 1-1/2 inch outside diameter non-magnetic satin finish 16 gauge (0.063 type 304 stainless tubing.
  - b. Sizes and configurations as indicated on Contract Drawings.
  - c. Font handrail: Provide peened nonslip textured gripping surface.
- 2. Pipe Sleeves: 2 inch diameter by 6 to 9 inch long non-magnetic stainless steel.
  - a. Handrails to Font.
    - 1) Brackets, Flanges, Fittings, And Anchors:
      - a) Provide standard wall brackets, flanges, miscellaneous fittings, and anchors for connection of handrails and railings to other construction.
      - b) Provide inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work.
  - b. Handrails to Platform.
    - 1) Brackets, Flanges, Fittings, And Anchors:
      - Provide standard wall brackets, flanges, miscellaneous fittings, and anchors for connection of handrails and railings to other construction.
- 3. Rostrum Riser Handrail (floor mounted).
  - a. Stainless steel bar.
  - b. Stainless steel mounting plate for hardwood handrail.
  - c. Sizes and configurations as indicated on Contract Drawings.

# B. Fabrication:

- 1. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly.
- 2. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- 3. Grind smooth welded joints and buff welds to same appearance as remainder of railing.
- 4. Form curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- 5. Return pipe ends of wall mounted handrails into wall.
- 6. Welded Connections:
  - a. Fabricate railing system and handrail connections by welding.
  - b. Weld corners and seams continuously to comply with following:
    - 1) Use materials and methods that minimize distortion and develop of metals.
    - 2) At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
    - 3) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and so contours of welded surfaces match adjacent surfaces.

#### 2.2 ACCESSORIES

# A. Rail Setting Grout:

- 1. Commercial non-shrink grout conforming to requirements of ASTM C1107, Type B or Type C.
- 2. Type Two Acceptable Manufacturers:
  - a. Normal Construction Grout A by Bonsal American, Charlotte, NC www.bonsal.com.
  - b. Advantage 1107 Grout by Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
  - c. NS Grout by Euclid Chemical Co, Cleveland, OH www.euclidchemical.com
  - d. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
  - e. Duragrout by L&M Construction Chemicals Inc, Omaha, NE www.lmcc.com.
  - f. Sonneborn / BASF Building Systems, Shakopee, MN www.chemrex.com.
  - g. Tamms Grout 621 by TAMMS Industries, Mentor, OH www.tamms.com.
  - h. US Spec MP Grout by US Mix Products Co, Denver, CO www.usspec.com.
  - i. CG-86 Grout by W R Meadows, Hampshire, IL www.wrmeadows.com.
  - j. Equal as approved by Architect before use. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Touch up field welds to match finished material.

# SECTION 05 5871 METAL BRACKETS

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
  - Metal Brackets:
    - a. Metal brackets necessary to support Vanities in Rest Rooms.
    - b. Metal brackets necessary to support Clerk's Office Desk.
    - c. Metal brackets necessary to support Dressing Room benches.
- B. Related Requirements:
  - 1. Metal Brackets:
    - a. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.
    - b. Section 05 0523: 'Metal Fastening' for quality of welding.
    - c. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of metal brackets.
    - d. Section 11 9116: 'Baptismal Font Mirror' for brackets for font mirror.

# 1.2 REFERENCES

- A. Reference Standards (Metal Brackets):
  - 1. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.

# PART 2 - PRODUCTS

# 2.1 FABRICATED UNITS

- A. Materials:
  - 1. Metal Brackets:
    - a. Steel: Meet requirements of ASTM A36/A36M.
    - b. Fabrication:
      - 1) Fabricate as detailed.
      - 2) Grind exposed welds smooth and polish to match non-welded metal finish.
      - 3) After fabrication and drilling of mounting holes, shop prime.

PART 3 - EXECUTION: Not Used

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# **DIVISION 6 - WOOD AND PLASTICS:**

06 0000	Wood Plastics and Composites
06 0573	Preservative Wood Treatment
06 1000	Rough Carpentry
06 1011	Wood Fastenings
06 1100	Wood Framing
06 1636	Wood Panel Product Sheathing
06 1643	Gypsum Sheathing
06 1712	Structural Composite Lumber: SCL
06 1733	Wood 'I' Joists
06 1753	Shop-Fabricated Wood Trusses: Trussed Rafters
06 1800	Glued-Laminated Construction
06 2000	Finish Carpentry
06 2001	Common Finish Carpentry Requirements
06 2024	Door, Frame, And Finish Hardware Installation
06 2210	Miscellaneous Wood Trim
06 2710	Shelving
06 4000	Architectural Woodwork
06 4001	Common Architectural Woodwork Requirements
06 4005	Plastic Laminate
06 4114	Wood-Veneer-Faced Architectural Cabinets: Custom
06 4115	Rostrum Casework
06 4313	
06 4512	Architectural Woodwork Wood Trim: Custom
06 6000	Plastic Fabrications
06 6001	Miscellaneous Plastic Fabrications

# SECTION 06 0573 PRESERVATIVE WOOD TREATMENT

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of wood preservative treatment where specified.
- B. Related Requirements:
  - 1. Section 06 1100:
    - a. Characteristics of wood to be pressure-treated.
    - b. Furnishing and installing of pressure-treated wood.
  - 2. Section 06 0573.93: 'Insect Protection Wood Treatment' for more aggressive wood treatment protection if needed to protect wood.:

#### 1.2 REFERENCES

#### A. Definitions:

- Preservative-Treated Wood: Wood exposed to high levels of moisture or heat susceptible to decay by fungus and
  other organisms, and to insect attack. The damage caused by decay or insects can jeopardize the performance of
  the wood members so as to reduce the performance below that required. Preservative treatment requires
  pressure-treatment process to achieve depth of penetration of preservative into wood to verify that the wood will
  be resistant to decay and insects over time.
- 2. Treated Wood: Wood impregnated under pressure with compounds that reduce its susceptibility to flame spread or to deterioration caused by fungi, insects, or marine bores.
- B. Reference Standards:
  - 1. American Wood Protection Association:
    - a. AWPA U1-12, 'Use Category System: User Specification For Treated Wood'.
  - 2. International Building Code (IBC) (2015 or latest approved edition by AHJ):
    - a. Chapter 23, 'Wood':
      - 1) Section 2300, 'Minimum Standards and Quality':
        - a) 2303.1, 'General':
          - (1) 2303.1.8, 'Preservative-Treated Wood'.
      - 2) Section 2400, 'General Construction Requirements':
        - a) 2304.11, 'Protection Against Decay and Termites':
          - (1) 2311.2, 'Wood Used Above Ground'.
          - (2) 2311.4, 'Wood In Contact With The Ground'.

# 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificate: Certificate of pressure treatment showing compliance with specification requirements and including information required under IBC Section 2303.1.8.1, 'Identification'.

#### PART 2 - PRODUCTS

# 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers:
    - a. Arch Wood Protection Inc, Atlanta, GA www.wolmanizedwood.com.

- b. Hoover Treated Wood Products, Thomson, GA www.frtw.com.
- c. Osmose Inc, Griffin, GA www.osmose.com.
- d. U S Borax Inc, Valencia, CA www.borax.com/wood.
- e. Viance LLC, Charlotte, NC www.treatedwood.com.
- f. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Performance:

- 1. Framing lumber grade and species shall be as specified in Section 06 1100 for particular use.
- 2. Interior Wood In Contact With Concrete or Masonry:
  - a. Preservatives:
    - Disodium octoborate tetrahydrate (DOT / SBX) meeting requirements of AWPA U1 and with retention of 0.25 lbs per cu ft.
    - 2) Zinc borate meeting requirements of AWPA U1 and with retention of 0.17 lbs per cu ft.
    - 3) CCA-C (47.5 percent chromium trioxide, 18.5 percent copper oxide and 34 percent arsenic pentoxide) by Koppers Performance Chemicals, Griffin, Georgia, http://www.koppersperformancechemicals.com/ (0.25 lb/cu ft minimum retention).
    - DURA-GUARD by Hoover Treated Wood Products, Thomson, GA www.frtw.com (.40 lb/cu ft minimum retention).
  - b. Lumber: Treat in accordance with AWPA U1.

PART 3 - EXECUTION: Not Used

# SECTION 06 1011 WOOD FASTENINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of wood fastening methods and materials used for Rough Carpentry unless specified otherwise.
- B. Related Requirements:
  - 1. Section 03 1511: 'Concrete Anchors and Inserts' for Quality of Anchors and Inserts.
  - 2. Section 05 0523: 'Metal Fastenings' for Quality of bolts used for Rough Carpentry.
  - 3. Furnishing and installing of other fasteners are specified in individual Sections where installed.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM D3498-03(2011), 'Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems'.
    - c. ASTM F1667-17, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature on framing anchors and powder actuated fasteners.
  - Shop Drawings:
    - a. Submit diameter and lengths of fasteners proposed for use on Project. If length or diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
      - 1) Adjusted fastener spacing where using proposed fasteners and,
      - Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
    - b. Submit on powder-actuated fasteners other than those specified in Contract Documents showing design criteria equivalents at each application.
    - c. Show type, quantity, and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

- A. Description:
  - 1. Nail Terminology:
    - a. When following nail terms are used in relation to this Project, following lengths and diameters will be understood. Refer to nails of other dimensions by actual length and diameter, not by one of listed terms:

Nail Term	Length	Diameter
8d Box	2-1/2 inches	0.113 inch
8d Common	2-1/2 inches	0.131 inch
10d Box	3 inches	0.128 inch

10d Common	3 inches	0.148 inch
16d Box	3-1/2 inches	0.135 inch
16d Sinker	3-1/4 inches	0.148 inch
16d Common	3-1/2 inches	0.162 inch

#### B. Materials:

- 1. Wood fastener list:
  - a. Provide VMR Suppliers with wood fastener list.
- 2. Fasteners:
  - a. General:
    - 1) Fasteners for preservative treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronzed, or copper. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153/A153M.
  - b. Nails:
    - 1) Meet requirements of ASTM F1667.
    - 2) Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.
  - c. Wood Screws:
    - 1) SDS Screws:
      - a) Category Four Approved Products. See Section 01 6200 for definitions of categories.
        - (1) SDS Screws by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
      - All Other: Standard type and make for job requirements.
  - d. Powder-Actuated Fasteners:
    - 1) Type One Quality Standard: Hilti X-DNI 62P8.
    - 2) Manufacturers:
      - a) Hilti, Tulsa, OK www.us.hilti.com.
      - Redhead Division of ITW, Wood Dale, IL www.itw-redhead.com and Markham, ON www.itwconstruction.ca.
      - Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.
- 3. Adhesives:
  - a. Construction Mastics:
    - 1) Meet requirements of 'APA-The Engineered Wood Association' Specification AFG-01 or ASTM D3498.
    - 2) Use phenol-resorcinol type for use on pressure treated wood products.
- 4. Framing Anchors:
  - a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc-coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.
  - b. Type Two Acceptable Products:
    - 1) KC Metals Inc, San Jose, CA www.kcmetals.com.
    - 2) Simpson Strong Tie Co. Dublin, CA www.strongtie.com.
    - 3) United Steel Products Co Inc (USP), Montgomery, MN www.uspconnectors.com.
    - 4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

## PART 3 - FXFCUTION

#### 3.1 ERECTION

- A. Secure one Manufacturer approved fastener in each hole of framing anchor that bears on framing member unless approved otherwise in writing by Architect.
- B. Provide washers with bolt heads and with nuts bearing on wood.

# END OF SECTION

WOOD FASTENINGS - 2 - 06 1011

# SECTION 06 1100 WOOD FRAMING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install wood framing and blocking as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Hanger brackets with bolts, nuts, and washers for basketball standards.
  - Glue-laminated structural units.
  - 3. Miscellaneous structural steel elements.
  - 4. Roof related blocking and wood nailers.
  - 5. Stair stringers.
  - 6. Structural composite lumber.
  - 7. Wood 'I' joists.
  - 8. Wood panel product sheathing.
  - 9. Wood trusses.

# C. Related Requirements:

- 1. Section 05 1223: 'Structural Steel For Buildings' for furnishing of miscellaneous structural steel.
- 2. Section 06 0573: 'Preservative Wood Treatment' for quality of preservative wood treatment.
- 3. Section 06 1636: 'Wood Panel Product Sheathing' for:
  - a. Pre-installation conference held jointly with Section 06 1100.
- 4. Section 06 1712: 'Structural Composite Lumber SCL'.
- 5. Section 06 1733: 'Wood I Joists'.
- 6. Section 06 1753: 'Shop Fabricated Wood Trusses'.
- 7. Section 06 1800: 'Glued-Laminated Construction'.
- 8. Sections under 06 4000 Heading: 'Architectural Woodwork' for wall blocking requirements.
- 9. Section 06 4313: 'Wood Stairs' for wood stair treads and risers.
- 10. Sections in Division 07: Roofing membranes for related blocking and wood nailers.
- 11. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts':
  - a. Pre-installation conference held jointly with Section 06 1100.
- 12. Section 11 6624: 'Basketball Equipment' for furnishing of hanger brackets with bolts, nuts, and washers for basketball standards.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. American Lumber Standard Committee (ALSC) (Maintains NIST standard):
    - a. Voluntary Product Standard:
      - 1) PS 20-15, 'American Softwood Lumber Standard'.
  - 2. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:
    - a. Voluntary Product Standard DOC PS 20-15, 'American Softwood Lumber Standard'.
- B. Reference Standards:
  - 1. Truss Plate Institute / Components Association:
    - a. TPI / SBCA. 'Building Component Safety Information BCSI 2013, 'Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference held jointly with Section 06 1636.

WOOD FRAMING - 1 - 06 1100

- a. Schedule pre-installation conference immediately before beginning framing work.
- b. In addition to agenda items specified in Section 01 3100, review following:
  - 1) Equipment and gypsum board blocking in wood framed walls.
  - 2) Operable partition headers.
  - 3) Rough opening.
  - 4) Shear walls and struts.
  - 5) Nails and nailing requirements.
  - 6) Truss installation.
  - 7) Connections.
- 2. Participate in pre-installation conference held jointly with Section 08 4113.
  - a. Schedule pre-installation conference for one (1) week before scheduled installation of storefront system.
  - b. In addition to agenda items specified in Section 01 3100, review following:
    - 1) Rough opening requirements.

# 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Technical and engineering data on nails to be set by nailing guns for Architect's approval of types proposed to be used as equivalents to specified hand set nails and adjusted number and spacing of pneumaticallydriven nails to provide equivalent connection capacity.
  - 2. Manufacturer Instructions:
    - a. Copies of pamphlets specified in REFERENCE Article. After Architect's examination, keep pamphlets on Project site with approved shop drawings. Pamphlets may be obtained from Truss Plate Institute, Wood Truss Council of America, or from Truss Fabricator.

# 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Suppliers:
    - a. Licensed by American or Canadian Institute of Timber Construction, or American Wood Systems.
    - b. VMR Approved Supplier(s):
      - 1) Approval subject to VMR agreement process approval.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Protect lumber and sheathing and keep under cover in transit and at job site.
  - 2. Do not deliver material unduly long before it is required.
- B. Storage And Handling Requirements:
  - 1. Store lumber and sheathing on level racks and keep free of ground to avoid warping.
  - 2. Stack to insure proper ventilation and drainage.
  - 3. Handle and store wood trusses in accordance with ANSI / WTCA Booklet BSCI except trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and no part of any truss is required to drop more than 18 inches.

## PART 2 - PRODUCTS

# 2.1 SUPPLIERS

- A. Suppliers:
  - Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
    - a. BMC, West Jordan, UT. www.BuildWithBMC.com. Contact Par Palmer:
      - 1) Office: (801) 224-0541.
      - 2) Mobile: (801) 376-9853.

- 3) E-Mail: Par.Palmer@BuildWithBMC.com or www.BuildWithBMC.com.
- b. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
  - 1) Office: (800) 962-8780.
  - 2) FAX: 801-782-9652.
  - 3) E-Mail: tom@thomasforest.com.
- c. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Mike Running:
  - 1) Office: (800) 662-3612.
  - 2) Cell: NA.
  - 3) FAX: (503) 238-2663.
  - 4) E-Mail: mrunning@shelter-products.com.

#### 2.2 MATERIALS

- A. Wood Framing List:
  - 1. Provide VMR Suppliers with wood framing list.
- B. Dimension Lumber:
  - 1. Design Criteria:
    - a. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
    - b. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
    - c. Lumber 2 inches or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15'.
    - d. Preservative Treated Plates / Sills:
      - 2x4: Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID www.ilevel.com. (LSL 1.3 E)
      - 2) 2x6 And Wider: No. 2 or or MSR 1650f 1.5e Douglas Fir, Southern Pine, HemFir, or StrandGuard by iLevel by Weyerhaeuser, Boise, ID www.ilevel.com. (LSL 1.3 E).
- C. Posts, Beams, And Timbers 5 Inches by 5 Inches And Larger:
  - 1. Design Criteria:
    - a. No. 1 or better Douglas Fir or Southern Pine.
- D. Lumber Ledgers:
  - 1. Design Criteria:
    - a. No. 2 Douglas Fir-Larch, or Southern Pine.
- E. See Contract Drawings for additional requirements.

# 2.3 ACCESSORIES

- A. Accordion Folding Partition Headers:
  - 1. See specification requirements of Section 06 1636 and as shown on Contract Drawings.
- B. Blocking:
  - 1. Sound lumber without splits, warps, wane, loose knots, or knots larger than 1/2 inch.
- C. Furring Strips:
  - 1. Utility or better.
- D. Sill Sealer:
  - 1. Closed-cell polyethylene foam, 1/4 inch thick by width of plate.

WOOD FRAMING - 3 - 06 1100

#### PART 3 - EXECUTION

# 3.1 INSTALLATION

#### A. General:

1. Use preservative treated wood for wood members in contact with concrete or masonry, including wall, sill, and ledger plates, door and window subframes and bucks, etc.

#### B. Interface With Other Work:

- 1. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties. Do not allow installation of gypsum board until required blocking is in place.
- 2. Where manufactured items are to be installed in framing, provide rough openings of dimensions within tolerances required by manufacturers of such items. Confirm dimensions where not shown on Contract Drawings.

# C. Tolerances:

- 1. Walls:
  - a. 1/4 inch in 20 feet, non-cumulative in length of wall.
  - b. 1/8 inch in 10 feet with 1/4 inch maximum in height of wall.
  - c. Distances between parallel walls shall be 1/4 inch maximum along length and height of wall.

#### D. Floors:

- 1. Place with crown side up.
- 2. Provide accurately fitted header and trimmer joists of same size as regular joists around floor openings, unless detailed otherwise, and support by steel joist hangers.
- 3. Double joists under partitions that parallel run of joists.

#### E. Walls:

- 1. Openings: Single, bearing stud supporting header and one adjacent (king) stud continuous between top and bottom plates, unless shown otherwise.
- 2. Corners And Partition Intersections: Triple studs.
- 3. Top Plates In Bearing Partitions: Doubled or tripled and lapped. Stagger joints at least 48 inches.
- 4. Firestops:
  - a. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over 10 feet in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
  - Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of 20 feet, length or height.

## 5. Sill Plates:

- a. Shear Walls And Bearing Walls:
  - 1) Provide specified anchor 12 inches maximum and 4 inches minimum from each end of each plate.
  - 2) Shear Walls: Fasten with anchor bolts embedded in concrete or with screw anchors.
  - 3) Bearing Walls: Fasten with anchor bolts embedded in concrete, or with screw anchors or expansion bolts in drilled holes.
- b. Non-Structural Walls: Fasten with powder actuated fasteners.
- c. In addition to requirements of paragraphs 'a' and 'b' above, set sill plates of interior walls measuring less than 36 inches in length in solid bed of specified construction adhesive, except where sill sealer is used.
- d. Install specified seal sealer under sill plates of exterior walls of main building and of acoustically insulated interior walls.

#### 6. Posts And Columns:

a. Unless shown otherwise, nail members of multiple member columns together with 16d at 6 inches on center from each side.

#### 7. Beams And Girders:

- a. Built-Up Members:
  - 1) Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
  - 2) Unless shown otherwise on Drawings, nail two-ply built-up members with 10d nails 12 inches on center top and bottom, staggered on opposite sides. Nail three-ply built-up members with 16d nails at 12 inches on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.

- b. Pre-Fabricated Members:
  - Solid glu-lam, LVL, LSL, or PSL members may be used in place of built-up 2x framing members. Size shall be same as built-up member.
  - Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum
    of built-up members.
- c. Wood shims are not acceptable under ends.
- d. Do not notch framing members unless specifically shown in Drawing detail.

#### Nailing:

a. Stud to plate (coordinate with Contract Drawings):

2 by 4 inch nominal	End nail, two 16d OR toe nail, four 8d
2 by 6 inch nominal	End nail, three 16d OR toe nail, four 8d
2 by 8 inch nominal	End nail, four 16d OR toe nail, six 8d
2 by 10 inch nominal	End nail, five 16d OR toe nail, six 8d
1-3/4 by 5-1/2 inch LVL	End nail, three 16d OR toe nail, four 8d
1-3/4 by 7-1/4 inch LVL	End nail, four 16d OR toe nail, six 8d
1-3/4 by 9-1/4 inch LVL	End nail, five 16d OR toe nail, six 8d
1-3/4 by 11-1/4 inch LVL	End nail, six 16d OR toe nail eight 8d

- b. Top plates: Spiked together, 16d, 16 inches on center.
- c. Top plates: Laps, lap members 48 inches minimum and nail with 16d nails 4 inches on center
- d. Top plates: Intersections, three 16d.
- e. Backing And Blocking: Three 8d, each end.
- f. Corner studs and angles: 16d, 16 inches on center.

## F. Roof And Ceiling Framing:

- 1. Place with crown side up at 16 inches on center unless noted otherwise.
- 2. Install structural blocking and bridging as necessary and as described in Contract Documents.
- 3. Special Requirements:
  - a. Roof And Ceiling Joists: Lap joists 4 inches minimum and secure with code approved framing anchors.
  - b. Roof Rafters And Outlookers:
    - 1) Cut level at wall plate and provide at least 2-1/2 inches bearing where applicable. Spike securely to plate with three 10d nails.
    - 2) Attach to trusses or other end supports with framing anchors described in Contract Documents.
    - 3) Provide for bracing at bearing partitions.
- 4. Installation of Wood Trusses:
  - a. Handle, erect, and brace wood trusses in accordance with TPI / WTCA Booklet BCSI.
  - b. Do not install damaged or broken wood trusses. Replace wood trusses that are broken, damaged, or have had members cut out during course of construction.
  - c. Provide construction bracing for trusses in accordance with TPI DSB-89.
  - d. Provide continuous 2x4 horizontal web bracing as shown on truss shop drawings.
    - 1) Secure bracing to each truss with two 10d or 16d nails.
    - 2) Lap splice bracing by placing bracing members side by side on common web member. Butt splices are not acceptable.
  - e. Unless directed or shown otherwise, provide diagonal 2x4 bracing between trusses at each line of horizontal web bracing.
    - 1) This diagonal bracing shall be continuous and extend from junction of web and top chord of one truss to junction of web and bottom chord of different truss.
    - Install bracing at approximately 45 degree angle. Bracing will extend over three trusses minimum or more as determined by height of trusses and 45 degree installation angle.
    - 3) Install brace on side of web opposite horizontal web bracing and nail to each web with two 10d or 16d nails.
    - 4) Install one brace every 20 feet as measured from top of brace to top of next brace.
- 5. Installation of Glue-Laminated Structural Units:
  - a. Install work in accordance with Fabricators instructions and Glue-Lam Erection Safety Practices.
  - b. Adequately support and brace work until tied into building structure to insure against collapse due to wind or other forces.
  - c. Maintain protection of beams until roofing has been installed.
- 6. Installation of Structural Composite Lumber:
  - Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
  - b. Install permanent bracing and related components before application of loads to members.

- 7. Installation of wood Web Joists:
  - a. Handle, erect, and brace sheathing wood web joists in accordance with Manufacturer's instructions.
  - b. Do not install damaged or broken wood web joists.
  - c. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
  - d. Cut holes through webs at locations or of sizes shown on Drawings and as recommended by Manufacturer.
- 8. Secure headers and header backing to structure as described in Contract Documents.
- G. Accessory / Equipment Mounting And Gypsum Board Back Blocking (nailers) for Wood Framing):
  - Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
- H. Furring Strips:
  - 1. On Wood or Steel: Nail or screw as required to secure firmly.
    - a. Ceiling:
      - 1) Attach furring strips to the underside of structural elements with #8 wood screws, of length to penetrate wood framing 1 inch minimum.
- I. Hanger brackets with bolts, nuts, and washers for basketball standards.
  - 1. See Basketball Equipment Specification for installation instructions and template:
    - a. Use Basketball Manufacturer's template for location of basketball hanger brackets.
    - b. Verify field dimension of brackets.

END OF SECTION

WOOD FRAMING - 6 - 06 1100

# **SECTION 06 1636**

# WOOD PANEL PRODUCT SHEATHING

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish and install wood panel product sheathing required for walls, roofs, and floors as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contracts Summary'.
  - Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 3. Section 06 1100: 'Wood Framing' for:
    - a. Pre-installation conference held jointly with Section 06 1636.

### 1.2 REFERENCES

- A. Association Publications:
  - 1. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:
    - a. Voluntary Product Standard DOC PS 1-09. 'Structural Plywood'.
    - b. Voluntary Product Standard DOC PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
  - 2. The Engineered Wood Association (APA), Tacoma, WA www.apawood.org.
    - a. Performance Rated Panels, 'Product Guide' (for products bearing the APA trademark) December 2011.
    - b. Voluntary Product Standard:
      - 1) PS 1-09. 'Structural Plywood'.
      - 2) PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
    - c. PRP-108 'Performance Standards and Policies for Structural-Use Panels'.
  - 3. TECO, Cottage Grove, WI www.tecotested.com.
    - a. TECO PRP-133: ('Fire Rated Assemblies OSB substitution for plywood in UL fire-rated assemblies that specify plywood).
- B. Reference Standards:
  - 1. International Code Council (IBC) (2015 or latest AHJ approved edition):
    - a. IBC Chapter 17, 'Special Inspections And Tests'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 06 1100.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 06 1100, review following:
    - a. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control inspection required of this section.
- B. Scheduling:
  - 1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing sheathing.

# 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:

- 1) Testing and Inspection Reports:
  - a) Testing Agency Inspection Reports of sheathing.

# 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Suppliers:
    - a. Licensed by American or Canadian Institute of Timber Construction, or American Wood Systems.
    - b. VMR Approved Supplier(s):
      - 1) Approval subject to VMR agreement process approval.
- B. Testing and Inspection:
  - 1. Owner will provide Testing and Inspection for inspection of sheathing:
    - a. Owner will employ testing agencies to perform inspection for sheathing as specified in Field Quality Control in Part 3 of this specification.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.
    - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control.
      - 1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Do not deliver material unduly long before it is required.
  - 2. Protect sheathing and keep under cover in transit and at job site.
- B. Storage And Handling Requirements:
  - 1. Store sheathing on level racks and keep free of ground.
  - 2. Stack to insure proper ventilation and drainage.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Suppliers:
  - 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
    - a. BMC, West Jordan, UT. www.BuildWithBMC.com. Contact Par Palmer:
      - 1) Office: (801) 224-0541.
      - 2) Mobile: (801) 376-9853.
      - 3) E-Mail: Par.Palmer@BuildWithBMC.com or www.BuildWithBMC.com.
    - b. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
      - 1) Office: (800) 962-8780.
      - 2) FAX: 801-782-9652.
      - 3) E-Mail: tom@thomasforest.com.
    - c. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Mike Running:
      - 1) Office: (800) 662-3612.
      - 2) Cell: NA.
      - 3) FAX: (503) 238-2663.
      - 4) E-Mail: mrunning@shelter-products.com.

### 2.2 MATERIALS

### A. Performance:

- 1. Design Criteria:
  - a. Meet requirements of PS 1, PS 2, or PRP-133 (TECO). Except where plywood is specifically indicated on Contract Drawings, oriented strand board (OSB) is acceptable.

### B. Sheathing:

- 1. Wood framing list:
  - a. Provide VMR Suppliers with wood framing list.
- Sheathing:
  - a. Sheathing shall bear grade stamp from American Plywood Association (APA) or equal grading organization.
  - b. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
  - c. Sheathing 23/32 inch thick and thicker used for single-layer subflooring shall be tongue and groove.
  - d. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.

e. Minimum span ratings for given thicknesses shall be as follows:

Thickness	Span Rating
7/16 inch nominal	24 / 16
15/32 inch actual	32 / 16
1/2 inch nominal	32 / 16
19/32 inch actual	40 / 20
5/8 inch nominal	40 / 20
23/32 inch actual	48 / 24
3/4 inch nominal	48 / 24

# 2.3 ACCESSORIES

### A. Nails:

1. As indicated on Contract Drawings.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. General:
  - 1. Top of nail heads shall be flush with sheathing surface.
  - 2. Use of edge clips to provide spacing between sheathing panels is acceptable.

### B. Wall Sheathing:

- 1. Spacing:
  - a. Provide 1/8 inch space between sheets at end and edge joints.
- 2. Edge Bearing And Blocking:
  - a. Panel edges shall bear on framing members and butt along their center lines.
  - b. Back block panel edges, which do not bear on framing members, with 2 inch nominal framing.
- 3. Nail Spacing:
  - a. As indicated on Contract Drawings.
  - b. Place nails not less than 3/8 inch in from edge.
- 4. Thickness:
  - a. As indicated on Contract Drawings.
- 5. Do not install any piece of wall sheathing with shortest dimension of less than 12 inches.

# C. Roof Sheathing:

- Placing:
  - a. Lay face grain at right angles to supports. Provide blocking for support if framing turns at roof overhang.
  - b. Provide 1/8 inch space between sheets at end and side joints.
  - c. Stagger panel end joints.

- d. Sheathing shall be continuous of two spans minimum.
- 2. Edge Bearing and Blocking:
  - a. As indicated on Contract Drawings.
- 3. Nail Spacing:
  - As indicated on Contract Drawings.
  - b. Place nails at least 3/8 inch in from edge.
- Thickness:
  - a. As indicated on Contract Drawings.
- 5. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches unless support is provided under all edges.

### D. Floor Sheathing:

- 1. Floor Sheathing: 1 Layer Subflooring (floors accessible to public).
  - Apply bead of glue to structural supports. Lay face grain / strength axis across supports and with panel continuous over two supports minimum.
  - b. Allow expansion gap of at least 1/2 inch at walls.
  - c. Tongue and Groove.
  - d. Nail Spacing.
    - 1) As indicated on Contract Drawings.
  - e. Thickness:
    - 1) As indicated on Contract Drawings.
  - f. Do not install any piece of bottom layer floor sheathing with shortest dimension of less than 24 inches.
- 2. Subflooring: 2 Layers Subflooring.
  - a. Bottom layer:
    - 1) Glue subflooring layers together along lines of structural supports.
    - 2) Leave 1/32 inch gap at side and end joints.
    - 3) Nail as per floor sheathing nailing requirements.
    - 4) Thickness:
      - a) 19/32 inch actual minimum thickness, except where specifically noted otherwise.
      - Do not install any piece of single layer floor sheathing with shortest dimension of less than 24 inches.
  - 5) Do r b. Top layer:
    - Stagger joints of second layer subflooring so they do not line up with joints of first layer subflooring, but do align with intermediate structural member (for example, align with field nailing of bottom subflooring layer).
    - 2) Glue subflooring layers together along lines of structural supports.
    - 3) Leave 1/32 inch gap at side and end joints.
    - 4) Nail at 6 inch centers on ends and 12 inch centers on intermediate structural members.
    - 5) Thickness
      - a) 19/32 inch actual minimum thickness, except where specifically noted otherwise.
    - 6) Do not install any piece of single layer floor sheathing with shortest dimension of less than 24 inches.

# 3.2 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. Sheathing:
    - a. General:
      - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
      - Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
    - b. For walls and roof areas where nail spacing is 4 inches and less on center, Inspector shall verify wood panel sheathing, grade, thickness and nominal size of framing members, adjoining panel edges, nail size and spacing, bolting and other fastening of other components.

### 3.3 PROTECTION

A. Protect roof sheathing from moisture until roofing is installed.

# SECTION 06 1643 GYPSUM SHEATHING

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install exterior gypsum sheathing required behind EIFS for exterior walls as described in Contract Documents
- B. Related Requirements:
  - 1. Section 07 2419: 'Water-Drainage EIFS'.

### 1.2 REFERENCES

- A. Definitions:
  - 1. Flame Spread Classification: Standard rating of relative surface burning characteristics of a building material as compared to a standard material.
  - 2. Gypsum Sheathing: Gypsum board used as a backing for exterior surface materials, manufactured with water-repellant paper and may be manufactured with a water-resistant core.
- B. Reference Standards:
  - ASTM International:
    - a. ASTM C1002-14, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs'.
    - b. ASTM C1177/C1177M-13, 'Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing'.
    - c. ASTM C1280-13a, 'Standard Specification for Application of Gypsum Sheathing',
    - d. ASTM D3273-12, 'Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber'.
    - e. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - f. ASTM E119-15, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
  - 2. Gypsum Association:
    - a. GA-253-07, 'Application of Gypsum Sheathing'.
    - b. GA-254-07, 'Fire-Resistant Gypsum Sheathing'.
  - 3. Underwriters Laboratories (UL):
    - a. UL 263: 'Test Method for Building Construction and Materials' (14th edition).
    - b. UL 723, 'Tests for Safety Test for Surface Burning Characteristics of Building Materials' (10th edition).

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's specifications and installation instructions for each product specified.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Burning Characteristics:
    - Meet requirements of ASTM E84 or UL 723.
  - 2. Fire-Test-Response Characteristics:
    - a. For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 or UL 263 by testing and inspecting agency acceptable to authorities having jurisdiction.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - Store materials stacked flat on leveled supports off ground to prevent sagging or damage to edges, ends and surfaces
  - Protect materials against damage from weather, direct sunlight exposure, surface contamination, construction traffic, or other causes.
  - 3. Follow Manufacturer's recommendations for protecting materials against mold from water exposure during storage, installation or after completion.

### 1.6 WARRANTY

- A. Manufacturer Warranty:
  - Defects:
    - a. Manufacturer's five (5) year Limited Warranty against defects.
  - Exposure:
    - a. Manufacturer's twelve (12) month Limited Warranty that product will withstand exposure to normal weather conditions when stored and installed according to Manufacturer's instructions.

### PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. CertainTeed Gypsum, Inc, Tampa, FL www.certainteed.com.
    - b. Georgia Pacific Gypsum Corp, Atlanta, GA www.gp.com.
    - c. USG, Chicago, IL www.usg.com.
- B. Gypsum Sheathing Board:
  - 1. Description:
    - Gypsum Sheathing is manufactured with a water resistive gypsum core with paper. Gypsum sheathing is intended for use as a substrate under exterior wall claddings in any climate.
  - 2. Design Criteria:
    - a. Non-fire-rated exterior wall construction:
      - 1) Meet requirements of ASTM C1177/C1177M, 1/2 inch thick, faced with water-resistant facing material front and back, and having treated core.
      - 2) Meet Burning Characteristics and Fire-Test Response Characteristics as specified in Quality Assurance in Part 1 of this specification.
      - 3) Meet mold resistance requirements of ASTM D3273: 10, in a test as manufactured.
      - 4) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
        - a) DensGlass Sheathing by Georgia Pacific.
        - b) GlasRoc Sheathing by CertainTeed.
        - c) Securock Glass-Mat by USG.

### 2.2 ACCESSORIES

### A. Fasteners:

 Bugle head screws as recommended by Sheathing Manufacturer and meeting requirements of ASTM C1002, corrosion resistant treated.

# PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Inspection:
    - a. Examine substrate and verify framing is suitable for installation of sheathing:
      - 1) Notify Architect of unsuitable conditions in writing.
      - 2) Do not install sheathing over unsuitable conditions.
      - 3) Commencement of Work by installer is considered acceptance of substrate.

### 3.2 INSTALLATION

- A. General:
  - Non-fire-rated exterior wall construction:
    - a. Comply with requirements of ASTM C1280, or GA-254, and Manufacturer's written instructions.
- B. Walls:
  - 1. Fastening:
    - Apply from center of wallboard towards ends and edges.
    - b. Do not apply screws closer than 3/8 inch to ends or edges. Screws on adjacent ends or edges shall be opposite each other. Space screws not over 6 inches on center.
    - c. Adjust power screw-driver to set heads in 1/32 inch dimple.
    - d. Drive screws with shank perpendicular to face of board.
  - 2. Single Layer Application:
    - a. Use board of size to give minimum number of joints.
    - b. Edge joints to be parallel to and occur over framing members.
    - c. Butt edges in moderate contact. Do not force in place.
    - d. Leave facings true with joint, finishing flush, vertical work plumb.
  - 3. Sealing Sheathing Joint/Penetrations:
    - a. Seal as required, according to Sheathing Manufacturer's written recommendations.
- C. Gypsum Board used with Soffits: Eliminate control and taped joints where board is sheathed with aluminum.

### 3.3 PROTECTION

- A. Gypsum Sheathing used with EIFS:
  - 1. Follow Manufacturer's recommendation for protecting gypsum sheathing from moisture and deterioration damage until air barrier, structural sheathing or exterior finish system is installed.

### END OF SECTION

GYPSUM SHEATHING - 3 - 06 1643

# SECTION 06 1712 STRUCTURAL COMPOSITE LUMBER: SCL

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Laminated Veneer Lumber (LVL).
  - 2. Parallel Strand Lumber (PSL).
  - 3. Laminated Strand Lumber (LSL).
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for installation, securing, bracing, etc.

### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D2559-12a, 'Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior Exposure Conditions'.
    - b. ASTM D5456-17, 'Standard Specification for Evaluation of Structural Composite Lumber Products'.

### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates: Provide certification confirming that material structural design properties and design stresses have met or exceed requirements shown on Drawings.
  - 2. Test And Evaluation Reports: Copies of ICC or CCMC reports showing approval materials.

# 1.4 QUALITY ASSURANCE

- A. Qualifications:
  - Suppliers:
    - a. VMR Approved Supplier(s):
      - 1) Approval subject to VMR agreement process approval.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Store members on job site in accordance with Manufacturer's instructions.
  - 2. Keep dry and provide supports to keep members off floor or ground.
  - 3. Split plastic wrappers of members stored encased in plastic on bottom side to allow for air circulation.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Suppliers:
  - 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:

- a. BMC, West Jordan, UT. www.BuildWithBMC.com. Contact Par Palmer:
  - 1) Office: (801) 224-0541.
  - 2) Mobile: (801) 376-9853.
  - 3) E-Mail: Par.Palmer@BuildWithBMC.com or www.BuildWithBMC.com.
- b. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
  - 1) Office: (800) 962-8780.
  - 2) FAX: 801-782-9652.
  - 3) E-Mail: tom@thomasforest.com.
- c. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Mike Running:
  - 1) Office: (800) 662-3612.
  - 2) Cell: NA.
  - 3) FAX: (503) 238-2663.
  - 4) E-Mail: mrunning@shelter-products.com.

### B. Acceptable Manufacturers:

- 1. Boise Cascade Corp, Boise, ID www.bc.com.
- 2. Georgia-Pacific Corp, Atlanta, GA www.gp.com.
- 3. Jager Industries Inc, Calgary, AB www.jagerbuildingsystems.com.
- 4. Louisiana Pacific Corp, Portland, OR www.lpcorp.com.
- 5. Roseburg Forest Products, Roseburg, OR www.roseburg.com.
- 6. Trus Joist Corp, Div Weyerhaeuser, Boise, ID www.tjm.com or Surrey, BC (604) 588-7878.
- 7. Web Joist, Chehalis, WA www.webjoist.com.
- 8. Weyerhaeuser, Engineered Lumber Products, Boise, ID www.woodbywy.com.
- 9. Equal as approved by Architect before bidding. See Section 01 6200.

# C. Design Criteria:

- 1. Materials shall be tested and evaluated in accordance with ASTM D5456.
- 2. Materials shall have current ICC-ES Evaluation Report, report approved by International Codes Council, or report issued by Architect approved model code evaluation service and shall comply with requirements of report.

### D. Materials:

- 1. Wood framing list:
  - a. Provide VMR Suppliers with wood framing list.
- 2. Members:
  - Identify materials by stamp or stamps indicating manufacturer's name, product trade name, grade, species (if applicable), evaluation report number, plant number, and name or logo of independent inspection agency.
- 3. Adhesive: Meet requirements of ASTM D2559.
- E. Fabrication: Materials shall be manufactured in a plant evaluated for fabrication by governing code evaluation service and under supervision of third party inspection agency listed by governing code evaluation service.

PART 3 - EXECUTION: Not Used

# SECTION 06 1733 WOOD 'I' JOISTS

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Plywood web 'I' joists, web stiffeners, and components.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for installation, securing, bracing, etc.

### 1.2 REFERENCES

- A. Association Publications:
  - 1. International Code Council (ICC):
    - ICC, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001, Phone (888) ICC-SAFE (422-7233) www.iccsafe.org.
    - b. ICC-ES Evaluation Reports, www.icc-es.org.

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Include following information on submitted shop drawings:
      - Show critical dimensions for determining fit and placement in building as well as loads joists are designed to support.
      - 2) Flange material and sizes.
      - 3) Size, thickness, and dimension of web.
      - 4) Lumber species and grades used.
      - 5) Web stiffener locations, make-up, and installation.
      - 6) Name and trademark of Manufacturer.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports: Copies of ICC reports showing approval of connections and webs.

# 1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Suppliers:
    - a. VMR Approved Supplier(s):
      - 1) Approval subject to VMR agreement process approval.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Store joists in vertical position protected from weather.
  - 2. Handle with care to prevent damage.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

### A. Suppliers:

- 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
  - a. BMC, West Jordan, UT. www.BuildWithBMC.com. Contact Par Palmer:
    - 1) Office: (801) 224-0541.
    - 2) Mobile: (801) 376-9853.
    - 3) E-Mail: Par.Palmer@BuildWithBMC.com or www.BuildWithBMC.com.
  - b. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
    - 1) Office: (800) 962-8780.
    - 2) FAX: 801-782-9652.
    - 3) E-Mail: tom@thomasforest.com.
  - c. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Mike Running:
    - 1) Office: (800) 662-3612.
    - 2) Cell: NA.
    - 3) FAX: (503) 238-2663.
    - 4) E-Mail: mrunning@shelter-products.com.

### B. Acceptable Manufacturers:

- 1. Boise Cascade Corp, Boise, ID www.bc.com.
- 2. Georgia-Pacific Corp, Atlanta, GA www.gp.com.
- 3. Jager Industries Inc, Calgary, AB www.jagerbuildingsystems.com.
- 4. Louisiana Pacific Corp, Portland, OR www.lpcorp.com.
- 5. Roseburg Forest Products, Roseburg, OR www.roseburg.com.
- 6. Trus Joist Corp, Div Weyerhaeuser, Boise, ID www.tjm.com or Surrey, BC (604) 588-7878.
- 7. Web Joist, Chehalis, WA www.webjoist.com.
- 8. Weyerhaeuser, Engineered Lumber Products, Boise, ID www.woodbywy.com.
- 9. Equal as approved by Architect before bidding. See Section 01 6200.

# C. Performance:

- 1. Design Criteria:
  - a. Provide joists that meet the load capacity and stiffness requirements shown on Drawings.
  - b. Provide joists that meet shear, moment, and stiffness properties shown on Drawings.
  - c. Custom design joists under supervision of registered professional engineer. Designs shall be in accordance with allowable values assigned by building code approval.
  - d. Only connections and webs currently approved by Research Committee of ICC or by Canadian Construction Materials Centre (CCMC) are acceptable for use.
  - Materials shall have current ICC-ES Evaluation Report, report approved by International Codes Council, or report issued by Architect approved model code evaluation service and shall comply with requirements of report.

### D. Materials:

- 1. Wood framing list:
  - a. Provide VMR Suppliers with wood framing list.

### 2.2 FABRICATION

A. Fabrication of joists shall be as approved by ICC, except where requirements of Contract Documents exceed ICC requirements.

### PART 3 - EXECUTION: Not Used

# END OF SECTION

WOOD 'I' JOISTS - 2 - 06 1733

# SECTION 06 1753 SHOP-FABRICATED WOOD TRUSSES

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
  - 1. Metal plate connected wood trusses.
  - 2. Trussed blocking for wood trusses.

# B. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary'.
- Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 3. Section 06 1100: 'Wood Framing' for:
  - a. Storage and handling of trusses on Project site.
  - b. Installing, securing, bracing, etc.
  - c. Required blocking other than trussed blocking.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. Structural Building Components Association (SBCA) www.sbcindustry.com.
  - Truss Plate Institute (TPI):
    - DSB-89, 'Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses'.
  - 3. Truss Plate Institute (TPI) / Structural Building Components Association (SBCA):
    - a. TPI/SBCA Structural Building Components Association Components Safety Information BCSI 'Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses' (2013 Edition with 2015 Update).

### B. Definitions:

- 1. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- C. Reference Standards:
  - 1. American National Standards Institute (ANSI) / Truss Plate Institute (TPI):
    - a. ANSI/TPI 1-2014, 'National Design Standard for Metal Plate Connected Wood Truss Construction.
  - 2. ASTM International:
    - a. ASTM A641M-09a(2014), 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'.
    - b. Drawings.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
  - Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work follow erection of trusses.

# 1.4 SUBMITTALS

- A. Action Submittals:
  - Shop Drawings:
    - a. Truss design drawings:

- Base truss design drawings on truss configurations and truss loads and requirements of Contract Documents. Joint configurations may be modified to allow double cut webs. Determine member forces from exact analysis method as defined by TPI.
- 2) Include following information:
  - Allowable loads in lbs per effective nail or lbs per sq inch for lumber and plates used as allowed by ICBO and current ICBO report number.
  - b) Stress reduction factors used for plates and lumber.
  - c) Top and bottom chord design loads in psf.
  - d) Size, thickness, and exact location by dimension of plates.
  - e) Lumber species and grades used.
  - f) Combine stress index for each member.
  - g) Stamp and signature of Engineer responsible for preparation of drawings.
  - h) Name and trademark of Plate Manufacturer if metal plates are used.
  - i) Name and address of Truss Fabricator and Project name and address.

# B. Informational Submittals:

- Certificates:
  - a. Complete and provide copy of certification "Truss Plant Certification Requirements Form" to Architect before bid.
  - b. Provide attachment copy of truss plant certification with completed "Truss Plant Certification Requirements Form" to Architect and Testing Agency before commencing fabrication of Wood Trusses.
- 2. Test And Evaluation Reports:
  - a. Copies of previous four quarterly inspection reports verifying compliance with TPI regulations unless the Truss Fabricator provides proof that they are certified and in good standing with the In-Plant WTCA QC program certification.

### 1.5 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 applies, but is not limited to the following:
  - Metal Connector-Plate Manufacturer Qualifications:
    - a. Member of TPI and complies with quality-control procedures in TPI 1 for manufacturer of connector plates.
      - 1) Fabricator's responsibility includes providing professional engineering services needed to assume engineering responsibility.
      - 2) Engineering responsibility: Preparation of shop drawings and comprehensive engineering analysis by qualified professional engineer registered in location of jurisdiction.
  - 2. Fabricator Qualifications:
    - a. Fabricator must have a letter providing evidence that they are certified and in good standing with their third party accredited Quality Assurance business.
    - b. Fabricator shall have in place a program requiring fabrication plant to be inspected four times each year by an independent testing laboratory in accordance with TPI regulations.

# 1.6 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - 1. Notify Architect two (2) days minimum before arrival of trusses to allow for scheduling of truss inspection on site before unloading and for monitoring of unloading procedure.
  - 2. Unload trusses by one of following methods.
    - a. As outlined in TPI / SBCA Booklet BCSI, 'Guide to Good Practice For Handling, Installing & Bracing of Metal Plate Connected Wood Trusses'.
    - Trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and if no part of any truss is required to drop more than 18 inches.
  - 3. After delivery of trusses:
    - a. Inspect for damage before installing trusses.
    - b. Inspect for "gaps" between framing members.
    - c. Discard and replace trusses that are damaged or defective.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Wood Truss Fabricators:
  - 1. Type Two Acceptable Fabricator:
    - a. Meet following requirements:
      - 1) Wood Truss fabricator whose products meet quality requirements of this Section.
      - Wood Truss fabricator shall be certified and submit copy of the truss plant certification with 'Truss Plant Certification Requirements Form' the Architect and Testing Agency before commencing fabrication of Wood Trusses.

# 2.2 MANUFACTURED UNITS

- A. Performance:
  - 1. Design Criteria:
    - a. Top and Bottom Chords and Web Members:
      - 1) 2 inch by 4 inch nominal minimum size unless noted otherwise by Contract Documents.
      - 2) Sizes, species, and grades of members shall be as required to provide combined stress indexes of less than one.
      - 3) Designed in accordance with ANSI/TPI 1 for given design loads.
      - 4) Of quality to meet or exceed stress grade requirements given in table below for each lumber classification and to meet requirements for dimension lumber in Section 06 1100. Truss members not called out on Drawings shall meet or exceed stresses of classification C.
        - a) Of quality to meet minimum stress grade requirements given below:

	Class A, 2x6	Class B, 2x6	Class C, 2x4	Class C, 2x6
Fb Bending	1720	1495	1510	1310
Ft Tension	1010	880	825	725
Fv Shear	75	75	75	75
Fc Perpendicular	405	405	405	405
Fc Parallel	1650	1485	1495	1430
E	1.6x10 <sup>6</sup>	1.5x10 <sup>6</sup>	1.5x10 <sup>6</sup>	1.5x10 <sup>6</sup>

- b) Allowable stresses shown are for normal duration of load and repetitive member use.
- c) Following machine stress rated lumbers may be substituted for the above lumbers provided the combined stress ratio for each member is less than 1.0 by National Design Specification for Wood formulas, 2001. Total load deflection is less than L/240 and live load deflection is less than L/360.

- b. Metal Gusset Plates:
  - Plate design and manufacture shall be as approved by 'The Research Committee for the ICC'.
  - Truss plates for symmetrical trusses shall be same size on both sides of truss. Determine size to be used by highest loading value on either side of truss.
- B. Materials:
  - 1. Wood framing list:
    - a. Provide VMR Suppliers with wood framing list.
  - 2. Top And Bottom Chords And Web Members:
    - a. Douglas Fir-Larch #2 or better, Hem Fir #1 or better, MSR 1650F-1.5E or better, Southern Pine #2 or better, or Spruce Pine Fir #2 or better.

### 3. Metal Gusset Plates:

- a. Connector plates to comply with TPI 1 from hot-dip galvanized steel sheet complying with ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inchthick.
  - 1) Use for interior locations.
- b. Manufacturer's name or trademark shall be visible on plates.
- c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1) Eagle Metal Products, Dallas, TX www.eaglemetal.com.
  - 2) ITW Building Components Group, Glenview, IL www.itwbcg.com.
  - 3) MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc. Chesterfield, MO www.mii.com or MiTek Canada, Bradford ON www.mii.com/canada.
  - Simpson AS Truss Connector Plates; Simpson Strong-Tie Company Inc. Pleasanton, CA www.strongtie.com.

### C. Fabrication:

### General:

- Fabrication of trusses shall be as approved by ICC except that this Specification shall govern when it exceeds ICC requirements.
- b. Fabricate trusses from approved shop drawings.
- c. Fabricate trusses in jigs with members accurately cut to provide good bearing at joints. Joints shall be acceptable if the average opening between ends of members immediately after fabrication is less than 1/16 inch
- d. Each chord section shall be involved in two (2) panel points before being spliced.

### 2. Metal Gusset Plates:

- a. No panel point shall have more than one (1) plate per truss side.
- b. Plates shall have minimum bite of 2-1/2 inches on members. Measure bite along center line of webs and perpendicular to chord axes. Orient plate axis parallel with truss chord axis except where chords change pitch or terminate. Plates may be placed parallel with webs at single web joints.
  - Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing and for other non-structural members.
  - 2) Minimum bite requirements are waived for truss blocking.

### c. Plate Sizes:

- 1) Minimum width of plates shall be 3 inches.
  - Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing.
  - b) Minimum width requirements are waived for truss blocking.
- 2) For flat bottom chord trusses, size plates for 110 percent of member forces. For scissor trusses, size plates for 150 percent of member forces. If webs are double cut, plates are to be sized for additional 10 percent of the member forces.
- 3) Size plates, nail and steel section for 110 percent of member forces.
- 4) No increase in plate values will be allowed for duration of loading or other factors.
- d. Press plates into members to obtain full penetration without crushing outer surface of wood. Plate embedment is acceptable if opening between plate and wood surface is less than 1/32 inch.
- e. Lumber defects and plate misplacement, in combination, shall not reduce plate area or number of effective teeth, prongs, or nails by more than ten percent.
- f. Do not apply metal gusset plates after shop fabrication.

# PART 3 - EXECUTION

# 3.1 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Prefabricated Metal Plate Connected Wood Trusses:
    - a. Testing Agency will obtain "Truss Plant Certification Requirements Form" attachment copy from Architect as per requirements of Section 06 1753 Shop-Fabricated Wood Trusses: Trusses Rafters.
    - b. Where truss clear span is 60 feet or greater, Inspector shall verify that temporary installation restraint/bracing and permanent individual truss member restraint/bracing are installed in accordance with approved truss submittal package.

# END OF SECTION

# **ATTACHMENTS**

# Truss Plant Certification Requirements Form

Metal Plate Connected Wood Truss suppliers shall be certified as evidenced by submittal of a copy of the truss plant certification with this completed form to the Architect and Testing Agency before commencing fabrication of Wood Trusses.

Metal Plate Connected (MPC) wood truss operations must design, manufacture and provide quality control and quality audits that comply with the latest edition of ANSI/TPI-1 promulgated by the Truss Plate Institute.

The truss plant must be certified by an independent third party accredited Quality Assurance business such as, but not limited to, the Truss Plate Institute (TPI); the Southern Pine Inspection Bureau, the Timber Products Inspection Bureau or the PFS Corp. The third party accredited Quality Assurance business must be under the auspices of the International Accreditation Services (IAS) or the American National Standards Institute (ANSI) and be ISO/IES Standard 17020 compliant. The inspection/audit process is to be completely independent of the truss manufacturer.

Truss plant	shall fulfill the following requirements (see www.sbcindustry.com and www.tpinst.org or www.tpic.ca):
th	hall have an independent and accredited third party inspection agency (Quality Assurance business) staff member visit the truss plant for the certification, and shall have at least one inspection done quarterly by an independent third party spection agency that is itself certified.
by Tf	hall meet all necessary in-plant requirements including: The Acceptance Criteria for Quality Documentation (ICC AC-10) y the ICC Evaluation Service, Inc. which shall include the quality control requirements of the Product Standard of ANSI / PI. Meeting the ANSI / TPI standard includes having an in-plant quality control manual, quality control procedures in lace, and meeting the weekly inspection frequency.
	o inspections at the required frequency and of the type established by the certification program. Specifically as a inimum, three trusses per set up location per shift per week.
	ot manufacture trusses or use components that do not comply with the requirements of this form and of the Contract ocuments.
	rovide proof of compliance to the requirements of this form and provide the proof to the General Contractor who will award it to the Architect prior to the truss plant providing a bid.
OR	
	shall be certified and be in good standing with the In-Plant WTCA QC program. This includes the following requirement becindustry.com and www.tpinst.org or www.tpic.ca):
Tr	russ plant has been trained by SBCA on the ANSI/TPI 1 QC standard.
Tr	russ plant has quarterly third party inspections, and that the third party has been trained by SBCA.
Tr	russ plant has quality control manual that meets the AC-10 requirements.
	russ plant has quality control procedures in place including: meeting the weekly inspection frequency, performing etailed inspections, and documenting any inspection problems and how they were resolved.
Tr	russ plant is sending their data quarterly to SBCA for review.
th	russ plant shall not manufacture trusses or use components that do not comply with the requirements of this form and of the Contract Documents.
iri-Piant W I	TCA QC certified plants are listed at www.sbcindustry.com/wtcaqccertco.php.

# SECTION 06 1800 GLUED-LAMINATED CONSTRUCTION

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Glu-lam beams.
- B. Related Requirements:
  - 1. Section 05 1223: Hardware and steel shapes.
  - 2. Section 06 1100: 'Wood Framing' for installation.

### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American National Standards Institute:
    - a. ANSI A190.1-2017, 'Standard for Wood Products Structural Glued Laminated Timber'.
  - ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel.

### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates: Copy of licensing certificate from AITC, APA-EWS, or CITC...

# 1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Fabricator: Licensed by American or Canadian Institute of Timber Construction, or American Wood Systems.
  - 2. Suppliers:
    - a. VMR Approved Supplier(s):
      - 1) Approval subject to VMR agreement process approval.

### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Fabricator: Licensed by American or Canadian Institute of Timber Construction, or American Wood Systems.
- B. Certifications:
  - 1. Each beam shall bear AITC, APA-EWS, or CITC quality mark.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Wrap members separately with heavy water repellent covers.
  - 2. Protect against damage in transit.

- B. Storage And Handling Requirements:
  - 1. Store and handle to insure maintenance of appearance.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

### A. Suppliers:

- Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
  - a. BMC, West Jordan, UT. www.BuildWithBMC.com. Contact Par Palmer:
    - 1) Office: (801) 224-0541.
    - 2) Mobile: (801) 376-9853.
    - 3) E-Mail: Par.Palmer@BuildWithBMC.com or www.BuildWithBMC.com.
  - b. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
    - 1) Office: (800) 962-8780.
    - 2) FAX: 801-782-9652.
    - 3) E-Mail: tom@thomasforest.com.
  - c. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Mike Running:
    - 1) Office: (800) 662-3612.
    - 2) Cell: NA.
    - 3) FAX: (503) 238-2663.
    - 4) E-Mail: mrunning@shelter-products.com.

### B. Materials:

- 1. Wood framing list:
  - a. Provide VMR Suppliers with wood framing list.
- 2. Wood:
  - a. Use stress grade 24F-1.8E Douglas Fir (24F-V4 DF/DF) or Southern Pine (24F-V3 SP/SP) unless noted otherwise on Contract Drawings.
  - b. Moisture content: twelve (12) percent maximum for straight, ten (10) percent maximum for curved.
  - c. Appearance:
    - 1) Industrial.
    - 2) Exposed in public areas: architectural grade.
  - d. Seal beam faces with penetrating sealer. Treat beam ends with wood preservative.
- 3. Adhesives: Wet-use type.
- 4. Hardware and steel shapes: Meet requirements of ASTM A36/A36M.

# C. Fabrication:

- 1. Fabricate beams in accordance with requirements of ANSI A190.1.
- 2. Camber beams to radius of 2000 ft unless shown otherwise on Contract Drawings.

### PART 3 - EXECUTION: Not Used

# SECTION 06 2001 COMMON FINISH CARPENTRY REQUIREMENTS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants required for items installed under this Section, as described in Contract Documents.
  - 2. Furnish and install following items as described in Contract Documents:
    - a. Decoration anchors in Cultural Center.
    - b. Coat and Hat Hooks.
    - c. Mesh Reinforcing used behind Grille Material.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Accordion Folding Partition hardwood jambs and trim.
  - 2. Architectural Woodwork.
  - 3. Basketball Hanger Brackets with bolts, nuts, and washers.
  - 4. Casings, stops, handrails, and jambs.
  - 5. Chair Rails.
  - 6. Factory Manufactured Access Doors.
  - 7. Fixed Shelving not part of casework.
  - 8. Fixed Sound-Absorptive Panels.
  - 9. Hardwood Base.
  - 10. Hardwood Trim at light coves, speaker cabinets, etc.
  - 11. Hardwood Trim for wall covering.
  - 12. Mesh Reinforcing used behind Grille Material.
  - 13. Miscellaneous Wood Trim.
  - 14. Organ Chamber panels and panel access door(s).
  - 15. Plastic Laminate Countertops.
  - 16. Rostrum Casework.
  - 17. Rostrum Ramp Handrail.
  - 18. Selected Building Specialties.
  - 19. Selected Equipment.
  - 20. Windows.
  - 21. Window Stools and Dressing Room Benches.
  - 22. Volleyball upright (standard) storage unit.
  - 23. Wood Stairs.
  - 24. Wood Trim at ceilings.
  - 25. Wood-Veneer-Faced Architectural Cabinets.
  - 26. Miscellaneous as specified elsewhere.
- C. Related Requirements:
  - 1. Section 05 5215: 'Stainless Steel Handrails' for Rostrum Riser Handrail stainless steel posts and frame.
  - 2. Section 06 1100: 'Wood Framing' for furring and blocking.
  - 3. Section 06 1636: 'Wood Panel Product Sheathing'.
  - 4. Section 06 2210: 'Miscellaneous Wood Trim'.
    - a. Wood Trim.
  - 5. Sections under 06 4000 Heading: Furnishing of Architectural Woodwork.
    - a. Section 06 4001: 'Common Architectural Woodwork Requirements':
      - 1) Approved Fabricators.
      - 2) Quality of wood materials to be used in Finish Carpentry.
    - b. Section 06 4005: 'Plastic Laminate' for countertops.
    - c. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets'.
      - 1) Custom Casework.
      - 2) Organ Chamber panels and access door(s).
    - d. Section 06 4115: 'Rostrum Casework'.
    - e. Section 06 4313: 'Wood Stairs'.
    - f. Section 06 4512: 'Architectural Woodwork Wood Trim'.

- 6. Section 06 6001: 'Miscellaneous Plastic Fabrications' for quality of Window Stools and Dressing Room benches.
- 7. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
- 8. Section 08 5313: 'Vinyl Windows' for furnishing of Windows.
- 9. Section 09 7314: 'Acoustic Wall Coverings: Grille Material' for furnishing of Grille Material used in Organ Chamber in Chapel.
- 10. Section 09 8413: 'Fixed Sound-Absorptive Panels' for furnishing of Sound Panels.
- 11. Sections under 09 9000 heading: Back priming of work to be installed against concrete or masonry or subjected to moisture, and finishing of finish carpentry and architectural woodwork.
- 12. Sections in Division 10: Furnishing of Specialties.
- 13. Sections in Division 11: Furnishing of Equipment.

### 1.2 REFERENCES

### A. Association Publications:

- 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA <a href="https://www.awinet.org">www.awinet.org</a>.
  - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

### B. Definitions:

- 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
  - a. Economy Grade: The lowest acceptable grade in both material and workmanship requirements, and is for work where price outweighs quality considerations.
  - b. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
  - c. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.
- 2. Hardware Cloth (Used at Organ Chamber): Welded or woven square mesh cloth of relatively light wire galvanized after welding or weaving (usually between 2 to 8 openings per lineal inch).
  - a. Plain Weave: Wires are crimped in zigzag fashion with wires intersecting at every available crimp or pocket.

### C. Reference Standards:

- 1. ASTM International:
  - a. ASTM C578-15, 'Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation'.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

# A. Manufacturers:

- 1. Manufacturer Contact List:
  - a. Blum Inc, Stanley, NC www.blum.com.
  - b. Bommer Industries, Landrum, SC www.bommer.com.
  - c. CompX National, Mauldin, SC www.nclnet.com.
  - d. Dow Chemical, Midland, MI www.dow.com.
  - e. Flynn & Enslow, San Francisco, CA www.flynnenslow.com.
  - f. Grass America Inc., Kernersville, NC www.grassusa.com.
  - g. Hafele America Co., Archdale, NC hafele.com.
  - h. Hillside Wire Cloth Co., Inc., Bloomfield, NJ www.hillsidewirecloth.com.
  - i. Ives, Indianapolis, IN www.iveshardware.com.
  - Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com or Knape & Vogt Canada, Mississaugua, ON (905) 676-8972.
  - k. Olympus Lock Co, Seattle, WA www.olympus-lock.com.
  - I. Owens Corning, Toledo, OH www.owens-corning.com.
  - m. Salice America Inc, Charlotte, NC www.saliceamerica.com.
  - n. SOSS Door Hardware (Division of Universal Industrial Products Company) Pioneer OH www.soss.com.
  - o. Stanley, New Britain, CT www.stanleyhardware.com or Oakville, ON (800) 441-1759.
  - p. TWP Inc., Berkley, CA www.twpinc.com.
  - q. Wire Cloth Manufacturers Inc., Mine Hill, NJ www.wireclothman.com.

- B. Glue: Waterproof and of best quality.
- C. Coat And Hat Hooks:
  - 1. Type Two Acceptable Manufacturers:
    - a. 581 by Ives.
    - b. Equal as approved by Architect before installation. See Section 01 6200.
- D. Cultural Center Decoration Anchors:
  - 1. Bright zinc plated lag eyebolts, wire size 4, 3-7/8 inches minimum total length.
  - 2. Class Two Quality Standard: 8414 by Stanley.
- E. Organ Chamber:
  - 1. Mesh Reinforcing (used behind Grille Material):
    - a. Hardware (Wire) Cloth:
      - 1) Design Criteria:
        - a) Plain Weave Wire Cloth:
        - b) Metal Type: Galvanized.
        - c) 2 x 2 Mesh.
        - d) Wire Gauge (SWG): 19.
      - 2) Class Two Quality Standard Manufacturers:
        - a) Flynn & Enslow.
        - b) Hillside Wire Cloth.
        - c) TWP.
        - d) Wire Cloth Manufacturers.
  - 2. Organ Chamber Panel Access Door Hinge:
    - a. Description:
      - 1) Cup Hinge (Concealed Hinge or European style).
      - 2) Steel, nickel-plated, full overlay, self closing with dowel, Mod 17.
    - b. Design Criteria:
      - 1) Panel Doors 48 inches High or Less:
        - a) Two (2) hinges.
        - b) Hinge Opening: 165 degree minimum.
      - 2) Panel Doors over 48 inches High:
        - a) Four (4) hinges.
        - b) Hinge Opening: 165 degree minimum.
    - c. Basis of Design: Model 329.03.558 with Model 329.73.510 mounting plate by Hafele:
      - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
        - a) Blum.
        - b) Grass America.
        - c) Hafele.
        - d) Knape & Vogt.
        - e) Salice.

### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Verify walls, ceilings, floors, and openings are plumb, straight, in-line, and square before installing Architectural Woodwork.
  - 2. Report conditions that are not in compliance to Architect before starting installation.

# 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Install Architectural Woodwork after wall and ceiling painting is completed in areas where Architectural Woodwork is to be installed.

B. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.

# 3.3 INSTALLATION

- A. Special Techniques:
  - AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for installation of architectural woodwork.
- B. General Architectural Woodwork Installation:
  - 1. Fabricate work in accordance with measurements taken on Project site.
  - 2. Scribe, miter, and join accurately and neatly to conform to details.
  - 3. Exposed surfaces shall be machine sanded, ready for finishing.
  - 4. Allow for free movement of panels.
  - 5. Countersink nails. Countersink screws and plug those exposed to view.
  - 6. Attach custom casework as specified in Sections under 06 4000 Heading: 'Furnishing of Architectural Woodwork' to wall blocking with #10 x 3 inch minimum Cabinet Screws. Attach wall cabinets with screws equally spaced horizontally not to exceed 12 inches 0.C. with 3 inch maximum spacing at cabinet edges.
- C. Installation for Accessories:
  - 1. Coat And Hat Hooks:
    - a. As shown in Contract Drawings.
  - Organ Chamber:
    - a. Mesh Reinforcing:
      - 1) Install behind grille material in Chapel.
    - o. Grille Material as furnished in Section 09 7314:
      - 1) Install grilles and cloth in such a way as to facilitate future replacement of fabric.
      - 2) Attach solidly and cushion to avoid any possibility of rattling from sound vibrations.
    - c. Organ Chamber Panel Access Door:
      - 1) Install in cabinet as shown on Contract Drawings.
- D. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.
  - 1. Organ Chamber panels and panel access door(s):
    - a. As shown on Contract Documents:
      - 1) Panels require Mesh Reinforcing behind Grille Material.
      - 2) Access Panels include Hinges.
  - 2. Window Stool:
    - Install window stool to structure with silicone sealant as specified in Section 07 9213 'Elastomeric Joint Sealant'.

# SECTION 06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants for caulking door frames as described in Contract Documents.
  - 2. Furnish and install insulation in door frames as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Flush wood doors.
  - 2. Hollow metal doors.
  - Hollow metal door frames.
  - 4. Finish hardware.
- C. Related Requirements:
  - 1. Section 07 2116: 'Blanket Insulation' for quality of fiberglass insulation.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants.
  - 3. Sections under 08 1000 heading: Furnishing of doors and metal frames.
  - 4. Sections under 08 7000 heading: Furnishing of finish hardware.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference.
  - 1. Participate in pre-installation conference.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
    - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
    - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
    - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Installer Report:
    - a. Report verifying correct operation and adjustment of installed hardware.
  - 2. Special Procedure Submittals:
    - a. Copy of 'Installation Guide for Doors & Hardware' by Door & Hardware Institute. Guide may be obtained from Door and Hardware Institute (DHI).

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - Wood Doors:
    - a. Do not have doors delivered to building site until after plaster, cement, and taping compound are dry.
    - b. If doors are to be stored at job-site for more than one week, seal top and bottom edges if not factory sealed.
  - 2. Metal Frames:
    - a. Examine door frames and note damage upon acceptance.

# B. Storage And Handling Requirements:

- Wood Doors:
  - a. Store flat on a level surface in a dry, well ventilated building.
    - 1) Cover to keep clean but allow air circulation
  - b. Handle with clean gloves and do not drag doors across one another or across other surfaces.
  - c. Do not subject doors to abnormal heat, dryness, or humidity or sudden changes therein
    - Condition doors to average prevailing humidity of locality before hanging.
- Metal Frames:
  - a. Protect metal frames from damage before and during installation.

# PART 2 - PRODUCTS: Not Used

### PART 3 - EXECUTION

### 3.1 INSTALLATION

# A. Hollow Metal Frames:

- Site Tolerances:
  - a. Squareness: 1/16 inch from top edge to opposite top edge.
  - b. Plumbness: 1/16 inch from top of jamb to bottom of jamb.
  - c. Alignment: 1/16 inch from plane of left side face of jamb to right side face of jamb.
  - d. Twist: 1/16 inch across throat of jamb plane measured across each face to plane of opposite jamb throat.
  - e. Finished Clearance Between Door And Frame:
    - 1) 1/16 inch at head and hinge jamb plus 1/16 inch maximum
    - 2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.
    - 3) 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.
  - 2. Set frame in location and level head.
    - a. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.
  - 3. Equalize with adjustable floor anchor.
  - 4. Set spreaders and fasten jambs to floor and wall.
    - a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
    - b. Cut notches for frame stops.
    - c. Do not remove spreaders until frames are permanently anchored in wall.
    - d. Use one spreader at base of frame and another at strike level.
    - e. Do not use temporary spreaders welded to base of jambs during installation of frame.
  - 5. Fill gap between frame and framing with urethane foam or tightly-packed fiberglass insulation. If urethane foam is used, foam interior of frames before installing frame. Trim excess before installation of frame.
  - 6. Caulking:
    - a. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.

# B. Doors:

- 1. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
- Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.

### C. Hardware:

- General:
  - a. Install using set of Manufacturer's installation, adjustment, and maintenance instructions submitted with hardware under Section 08 7101. Follow as closely as possible.
  - b. Mount closers on jamb stop side of door in parallel arm configuration where it is physically possible to do so and not damage or hinder operation of door or closer.
- Hardware for Wood Doors:
  - a. If doors are not factory-machined, use hardware templates furnished by Hardware Manufacturer when mounting hardware.
  - b. Set hinges flush with edge surface. Be sure that hinges are set in a straight line to prevent distortion.
  - c. Mount door latches high in strike plate opening so when door later settles, latch will not bind.

# 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
  - 2. Door frames:
    - Door frames damaged by use of crowbar or other prying devices to set door frames shall be repaired or replaced at no additional cost to Owner.

# 3.3 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
  - Using Owner's Operations And Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.
- B. Key Delivery:
  - 1. Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized, tagged, and placed in new key cabinet.

# SECTION 06 2210 MISCELLANEOUS WOOD TRIM

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install wood trim not specified elsewhere as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wall blocking required for Wood Trim.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements':
    - a. Installation of Wood Trim.
  - 3. Section 06 4001: 'Common Architectural Woodwork Requirements':
    - a. Approved Fabricators.
    - b. General standards for materials and fabrication of Architectural Woodwork.
  - 4. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 5. Section 09 9324: 'Interior Clear-Finished Hardwood'.

# 1.2 REFERENCES

- A. Association Publications:
  - Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA <a href="https://www.awinet.org">www.awinet.org</a>.
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- B. Definitions:
  - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
  - 2. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
      - 2) Design Criteria:
        - Provide 8 inch by 10 inch sample of Red Oak to match Owner provided stain color selected for Project.

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- b) Control Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.

# 1.4 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Design Criteria:
  - 1. General:
    - a. Meet requirements of Section 06 4001 for general standards for materials and fabrication of Architectural Woodwork.
  - 2. Clear Finished Hardwood:
    - a. Match materials specified in Section 06 4512.
    - b. Match finish specified in Section 06 4512 and match Owner selected sample as specified in Section 09 9324.

# 2.2 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

PART 3 - EXECUTION: Not Used

# SECTION 06 2710 SHELVING

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install adjustable shelving not part of casework, including mounting hardware, as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 4001: 'Common Architectural Woodwork Requirements'.

### 1.2 REFERENCES

- A. Association Publications:
  - Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

### PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Shelves:
  - 1. Design Criteria:
    - a. Conform to applicable requirements of Sections 06 4001.
    - b. Fabricate the work of this section to AWS 'Custom Grade'.
    - c. Species as acceptable for AWS 'Custom Grade'.
  - 2. Material:
    - a. Panel Product:
      - 1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
      - 2) Moisture content shall be same as specified for lumber.
      - 3) Cores:
        - a) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.
      - 4) Facings:
        - a) All facings shall be Melamine or Kortron.
      - 5) Thickness:
        - a) 30 Inch Span And Less: 3/4 inch thick.
        - b) Spans Over 30 Inches To 42 Inches: One inch thick.
        - c) Spans Over 42 inches: One inch thick and provide equal center supports.
    - b. Edgings:
      - Use 3/4 inch Kortron or Melamine faced Panel Product with hot glued 3 mm thick PVC with eased edges. Apply banding on all four edges of adjustable shelving and on exposed edges of fixed shelving, with one-inch return onto unexposed edges. Edge banding color to match Panel Product.
- B. Shelf Supports In Storage Building: 1x4 solid stock Pine, C or better, S4S.

# 2.2 ACCESSORIES

- A. Manufacturer:
  - Manufacturer Contact Information:

- Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com or Knape & Vogt Canada Inc, Mississuaga, ON (905) 676-8166.
- B. Shelf Brackets And Standards In Main Building:
  - Brackets:
    - a. Size according to shelf width, end of bracket to be within 2 inches of front edge of shelf.
    - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
      - 1) 187WH extra heavy duty brackets by Knape & Vogt.
  - 2. Standards:
    - a. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
      - 1) 87WH extra heavy duty standard by Knape & Vogt.

### PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Attach metal standards by screws into framing members or special blocking. Utilize all available pre-drilled screw holes in standards.
- B. Attach wood shelf supports with 16d finish nails through sheathing into framing members or special blocking, two nails minimum into each framing member. Attach shelves to supports with 1-1/2 inch long minimum flathead screws with heads countersunk to be flush or slightly below shelf surface, one screw at each shelf corner minimum.

END OF SECTION

SHELVING - 2 - 06 2710

# SECTION 06 4001 COMMON ARCHITECTURAL WOODWORK REQUIREMENTS

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - General standards for materials and fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.
  - 3. Section 06 2210: 'Miscellaneous Wood Trim'.
  - 4. Section 06 4005: 'Plastic Laminate'.
  - 5. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets'.
  - 6. Section 06 4115: 'Rostrum Casework'.
  - 7. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 8. Section 06 6001: 'Miscellaneous Plastic Fabrications'.
  - 9. Section 09 9324: 'Interior Clear-Finished Hardwood' for filling of nail holes and finishing.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA <a href="https://www.awinet.org">www.awinet.org</a>.
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- B. Definitions:
  - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature for specialty items and hardware not manufactured by Architectural Woodwork fabricator.
  - 2. Shop Drawings:
    - a. Approved VMR Fabricator:
      - 1) Fabricator First Submittal:
        - a) Provide 1/4 inch (or larger) scale building layout and/or description of required room walls required for field dimension for Field Quality Control Submittal. Provide submittal before rough framing is completed.
      - 2) Fabricator Second Submittal:
        - Provide shop drawings for cabinet and casework that are included for project showing details, casework locations and layout and required dimensions based on Field Quality Control Submittals for compliance to Contract Drawings for approval to Project Architect.
- B. Informational Submittals:
  - 1. Field Quality Control Submittals:
    - a. Contractor First Submittal:
      - 1) Provide verification field dimensions and updated Contract Drawings of all areas requested from Fabricator First Submittal from Approved VMR Fabricator including but limited to the following:

- a) Field dimensions (finish wall dimensions) of all walls with casework.
- Submit First Submittal to VMR Fabricator within three (3) days of completion of gypsum board installation but before gypsum board finishing to allow VMR Fabricator necessary time to complete casework.
- b. Second Submittal:
  - Provide verification field dimensions and updated Contract Drawings after Rostrum floor framing and gypsum board is installed in Rostrum area as requested from First Submittal from Approved VMR Fabricator including the following:
    - a) Field dimensions (finish wall dimensions) of all walls in rostrum area if included on project.
    - b) Field dimensions of rostrum floor framing.
- 2. Qualification Statement:
  - a. Fabricator:
    - 1) VMR Approved Fabricators:
      - a) Provide Qualification documentation as part of VMR agreement process.

### 1.4 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - Fabricator:
    - a. VMR Approved Fabricators:
      - 1) Approval subject to VMR agreement process approval.

# 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  - Fabricator Responsibility:
    - Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
    - b. Protect architectural woodwork from moisture and damage while in transit to job site.
  - 2. General Contractor Responsibility:
    - a. Report damaged materials received within two (2) days from delivery at project site.
- B. Storage And Handling Requirements:
  - 1. General Contractor Responsibility:
    - a. Unload and store in place where it will be protected from moisture and damage and convenient to use.

# 1.6 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

### PART 2 - PRODUCTS

### 2.1 FABRICATORS

- A. Approved Fabricators. See Section 01 4301 for Qualification Requirements.
  - Category One VMR Approved Fabricators. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements.
    - a. Anderson Cabinet and Millwork, 198 North 4700 East, Rigby, ID 83442.
      - 1) Contact Information: Matt Miller phone (208) 538-7415 cell (208) 317-7412 e-mail matt@andersoncabinet.net.
    - b. Michael Seiter & Co., Inc., P.O. Box 315 Heber City, UT 84032.
      - Contact Information: Mark Seiter phone (435) 654-0601 fax (435) 654-0613 e-mail mark@msandcoinc.com.

- c. Thompson and Sons Cabinets, 11834 N. 3400 West, Deweyville, UT 84309.
  - 1) Contact Information: David Thompson cell (435) 230-0876 office (435) 257-7152 e-mail zcabinets@comcast.net.
- 2. Same Approved Fabricator shall furnish following Specification Sections:
  - a. Section 06 2210: 'Miscellaneous Wood Trim'.
  - b. Section 06 4005: 'Plastic Laminate'.
  - c. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets'.
  - d. Section 06 4115: 'Rostrum Casework'.
  - e. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - f. Section 06 6001: 'Miscellaneous Plastic Fabrications'.

### 2.2 ASSEMBLIES

### A. Design Criteria:

- General:
  - AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.
- Materials:
  - a. Lumber:
    - 1) Grade:
      - a) No defects in boards smaller than 600 sq in.
      - b) One defect per additional 150 sq inches in larger boards.
      - c) Select pieces for uniformity of grain and color on exposed faces and edges.
      - d) No mineral grains accepted.
    - 2) Allowable Defects:
      - a) Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.
      - b) Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
      - Checks or splits not exceeding 1/32 inch by 3 inches and not visible after finishing when viewed beyond 18 inches.
      - d) Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
      - e) Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
    - 3) Use maximum lengths possible, but not required to exceed 10 feet without joints. No joints shall occur closer than 72 inches in straight runs exceeding 18 feet. Runs between 18 feet and 10 feet may have no more than one joint. No joints shall occur within 72 inches of outside corners nor within 18 inches of inside corners.
    - 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.

### B. Fabrication:

- 1. Follow Architectural Woodwork Standards (AWS) for fabrication of Architectural Woodwork.
- Tolerances:
  - a. No planer marks (KCPI) allowed. Sand wood members and surfaces with 100 grit or finer.
  - b. Maximum Gap: None allowed.
  - c. Flushness Variation: 0.015 inch maximum.
  - d. Sanding Cross Scratches: 1/4 inch maximum.
  - e. Plug screw holes. Screw locations not to be visible beyond 18 inches.
- 3. Fabricate work in accordance with measurements taken on job site.
- 4. 'Ease' sharp corners and edges of exposed members to promote finishing and protect users from slivers. Radius of 'easing' shall be uniform throughout Project and between 1/32 and 1/16 of an inch (.
- 5. Fabricate so veneer grain is vertical.
- 6. Joints:
  - a. Use lumber pieces with similar grain pattern when joining end to end.
  - b. Compatibility of grain and color from lumber to panel products is required.
- 7. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.
- 8. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

# PART 3 - EXECUTION: Not Used

# SECTION 06 4005 PLASTIC LAMINATE

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Wall-hung counters.
  - 2. Countertops for custom casework.

# B. Related Requirements:

- 1. Section 06 2001: 'Common Finish Carpentry Requirements':
  - a. Installation of wall-hung counters.
  - b. Installation of countertops for custom casework.
- 2. Section 06 4001: 'Common Architectural Woodwork Requirements':
  - a. Approved Fabricators.
  - b. General standards for materials and fabrication of Architectural Woodwork.
- 3. Sections Under 22 4200 Heading: Plumbing Fixtures.

# 1.2 REFERENCES

#### A. Association Publications:

- Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
  - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

#### B. Definitions:

- 1. Flame Spread: The propagation of flame over a surface.
  - Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
- 2. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
  - a. Premium Grade: Highest Grade available in both material and workmanship where highest level of quality, materials, workmanship, and installation is required.
- 3. High-Pressure Decorative Laminate (HPDL): Laminated thermosetting decorative sheets intended for decorative purposes. Also known as Plastic Laminate.
- Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.

## C. Reference Standards:

- 1. ASTM International:
  - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - b. ASTM E162-15a, 'Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source'.
- 2. Kitchen Cabinet Manufacturers Association:
  - a. ASTM/KCMA A161.1-2012, 'Performance And Construction Standards For Kitchen And Vanity Cabinets'.
- 3. National Electrical Manufacturer's Association / American National Standards Institute:
  - a. ANSI/NEMA LD-3-2005, 'High Pressure Decorative Laminates'.
- 4. Underwriters Laboratories, Inc.:
  - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (10th Edition).

#### 1.3 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - Color selections.

b. Manufacturer's technical data sheet.

#### B. Informational Submittals:

- 1. Certificates:
  - a. Provide Manufacturer's certification of compliance to ANSI/NEMA LD 3.
- 2. Test And Evaluation Reports:
  - a. Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties for Quality Assurance if requested by Owner or Architect.

#### C. Closeout Submittals:

- Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Record Documentation:
    - Manufacturers documentation:
      - a) Manufacturer's literature for plastic laminate.
      - b) Color selections.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
    - a. Surface-Burning Characteristics:
      - Plastic Laminate shall have Class A flame spread rating in accordance with ASTM E84 or UL 723
        Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.

# 1.5 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. Fabricators:
  - 1. Approved Fabricators. See Section 06 4001 for Approved Fabricators.
- B. Manufacturers:
  - 1. Type Two Acceptable Manufacturers:
    - a. Formica, Cincinnati, OH www.formica.com or Formica Canada Inc, St Jean sur Richelieu, PQ (450) 347-7541, all matte finish.
    - b. Nevamar, Odenton, MD www.nevamar.com.
    - c. Pionite Decorative Surfaces, Auburn, ME www.pionite.com.
    - d. WilsonArt, Temple, TX www.wilsonart.com or WilsonArt International Inc, Mississuaga, ON (905) 565-1255
    - e. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Plastic Laminates:
  - 1. Design Criteria:
    - a. Countertops:
      - 1) Post-formed front edge and backsplash, except where detailed otherwise, with plastic laminate meeting requirements of ANSI/NEMA LD 3: PF 42.
        - a) Vertical Applications: GP 28.
        - b) Horizontal (other than countertops): GP 38.
      - 2) No raised lip on front edge.

PLASTIC LAMINATE - 2 - 06 4005

- b. Balancing Material: BK 20.c. AWS Quality Grade: Premium.
- 2. Assemblies:
  - a. Countertops shall meet requirements of KCMA A161.1.
  - b. Adhesives for other than post-formed types shall be spray grade, high heat resistant, neoprene contact adhesive.
- 3. Category Four Approved Colors. See Section 01 6200 for definition of Categories:

Color Scheme Material Center, Chapel, and Clerk Restrooms and Serving Area

a. Emerald One: Pionite AT951-5 Pionite AT161

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

PLASTIC LAMINATE - 3 - 06 4005

# SECTION 06 4114 WOOD-VENEER-FACED ARCHITECTURAL CABINETS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Custom casework.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wall blocking required for Custom Casework.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of Custom casework.
  - 3. Section 06 4001: 'Common Architectural Woodwork Requirements' for:
    - a. Approved Fabricators.
    - General standards for materials and fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.
  - 4. Section 09 9324: 'Interior Clear-Finished Hardwood' for wood finishes.
  - 5. Sections Under 22 4200 Heading: Plumbing Fixtures.

# 1.2 REFERENCES

- A. Association Publications:
  - Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA <a href="www.awinet.org">www.awinet.org</a>.
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
    - b. HPVA, NWWDA, or APA.
  - 2. Hardwood Plywood & Veneer Association (HPVA), Reston, VA www.hpva@hpva.org.
  - 3. The Engineered Wood Association (APA), Tacoma, WA www.apawood.org.
  - 4. Window & Door Manufacturers Association (WDMA) Chicago, IL www.wdma@wdma.com.

# B. Definitions:

- 1. Book-Match: Matching between adjacent veneer leaves on one panel face. Every other piece of veneer is turned over so that the adjacent leaves are "opened" as two pages in a book. The fibers of the wood, slanting in opposite directions in the adjacent leaves, create a characteristic light and dark effect when the surface is seen from an angle.
- 2. Face Veneer: The outermost exposed wood veneer surface of a veneered wood door, panel, or other component exposed to view when the project is completed.
- 3. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
  - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
- 4. High-Pressure Decorative Laminate (HPDL): Laminated thermosetting decorative sheets intended for decorative purposes. Also known as Plastic Laminate.
- 5. Medium Density Fiberboard (MDF): Generic name for a panel or core manufactured from lignocellulosic fibers combined with synthetic resin or other suitable binder and bonded together under heat and pressure in hot press by process in which added binder creates entire bond.
- 6. Panel Product: Panels manufactured with differences in core materials, adhesives or binders which affect characteristics of the panels. These include wood veneers and many prefinished wood panels and decorative overlays with aesthetic and performance characteristics.
- 7. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.
- 8. Running Match: Each panel face is assembled from as many veneer leaves as necessary. Any portion left over from one panel may be used to start the next.
- 9. Veneer: A thin sheet or layer of wood, usually rotary cut, sliced or sawn from a log or flitch. Thickness may vary from 1/100 inch (0.3 mm) to 1/4 inch.

- C. Reference Standards:
  - 1. American National Standards Institute / Builders Hardware Manufacturers Association:
    - a. ANSI/BHMA A156.11-2014, 'Cabinet Locks'.
  - 2. American National Standards Institute / Hardwood Plywood & Veneer Association:
    - a. ANSI/HPVA HP-1-2009, 'Standard for Hardwood and Decorative Plywood'.
  - 3. American National Standards Institute / Window & Door Manufacturers Association (WDMA:
    - ANSI/WDMA I.S. 6A-13, 'Industry Standard for Architectural Stile and Rails Doors'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- 1. Coordinate the efforts of the various trades affected by the Work of this Section.
- 2. Coordinate completion of 2x6 wall blocking for custom casework.
- 3. Coordinate completion of custom casework.

# 1.4 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's literature or cut sheets for hardware.
- 2. Shop Drawings:
  - a. Confirm compliance with Contract Document requirements as to configuration and dimensions of custom casework.
  - Include plan and elevation views, materials used, standing and running trim profiles, assembly methods, joint details, fastening methods, accessories, and hardware.
- 3. Samples:
  - a. Interior Hardwood for Transparent Finish:
    - Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
    - 2) Design Criteria:
      - a) Provide 8 inch by 10 inch sample(s) of Red Oak to match Owner provided stain color selected for Project.
      - b) Control Sample will be used as performance standard for evaluating finish provided.

#### B. Informational Submittals:

- 1. Source Quality Control Submittals:
  - a. Samples:
    - 1) Interior Hardwood for Transparent Finish:
      - a) Owner will provide Control Sample for finish.
- 2. Special Procedure Submittals:
  - a. Copy of AWS manual with shop drawing submission.

## 1.5 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for period of five (5) years from date of substantial completion.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Components:
  - 1. Design Criteria:
    - a. General:
      - 1) Except as noted otherwise, fabricate the work of this section according to AWS 'Custom Grade'.

- a) Cabinet door wood grain direction shall run vertically and all doors shall be set matched.
- b) Cabinet drawer front wood grain direction may run vertically or horizontally, with same direction maintained on all cabinet or elevation of cabinets.
- 2) Casework Construction Type:
  - a) Type B: Face-frame construction where front edge of cabinet body components are overlaid with frame.
- 3) Door interface style:
  - a) Type B Construction: Flush Overlay.
- b. Solid Stock:
  - 1) Exposed: Plain sawn Red Oak.
  - Semi-exposed And Concealed: Species as acceptable for AWS 'Custom Grade'.
- c. Panel Product:
  - 1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
  - 2) Moisture content shall be same as specified for lumber.
  - 3) Cores
    - a) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft.
    - b) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.
  - 4) Facings:
    - Hardwood veneer facings shall be plain sliced Red Oak AWS Grade A, or equal by HPVA, WDMA, or APA.
    - b) All other facings shall be Melamine or Kortron.
  - 5) Edgings:
    - a) Cabinet Doors And Drawer Fronts Higher Than 8 Inches:
      - (1) 3/4 inch by 1/8 to 1/4 inch edge-banding of wood species matching hardwood face veneer.
    - b) Shelves And Exposed Panel Product Edges:
      - (1) Hot-glued, 3 mm thick, PVC edge-banding. Wood-grain, except color matching Melamine or Kortron surface at shelf edges.
    - c) Semi-Exposed Panel Product Edges:
      - (1) Hot-glued, 3 mm thick, wood grained PVC edge-banding.
- d. Casework Doors:
  - 1) Face Veneer:
    - a) Design Criteria:
      - (1) Plain sliced Red Oak meeting requirements of AWS Grade A, 1/50 inch thick minimum immediately before finishing.
      - (2) Face veneers shall be running book matched.
  - 2) Doors under 1-3/8 inch thick: Panel Product.

## B. Fabrication:

- 1. Cabinet Body:
  - a. Use AWS Flush Overlay construction on cabinet bodies.
  - b. If used, install Rail System adjustable shelf supports recessed.
- 2. Drawers:
  - a. Fabricate with separate, screw-attached drawer front.
  - b. Joints shall be dowel and pressure-glued, or lock shoulder, glued, and pin nailed.
  - c. Set bottoms into sides, backs, and subfront with 1/4 inch deep groove with 3/8 inch minimum standing shoulder.
  - d. Every drawer shall have specified drawer guides and pull installed. Install drawer guides with 'Euroscrews', and pulls with through-bolts passing through both front and sub-front.
- 3. Cabinet Doors:
  - a. Hinges: Install hinges using plastic insertion dowels for hinges and 'Euroscrews' for baseplates.
  - b. Every cabinet door shall have specified pull installed.
- 4. Cabinet Component Thickness And Material:
  - a. Use hardwood veneer facing on panel product, except on following surfaces:
    - 1) Where Kortron or Melamine shall be used.
    - Cabinet exposed interiors surfaces (not including cabinet doors) and shelving faces behind cabinet doors in all rooms.
    - 3) Cabinet semi-exposed surfaces.
    - 4) Cabinet concealed surfaces.
    - 5) Cabinet exposed exteriors permanently concealed (not exposed to view).
    - 6) Drawer sides, backs, bottoms, and subfronts.
  - b. Ends, Divisions, Bottoms, Tops: 3/4 inch thick panel product.
  - c. Rails: 3/4 inch thick panel product.

- d. Shelves:
  - 1) Panel product.
  - 2) Thickness:
    - a) 30 InchSpan And Less: 3/4 inch thick.
    - Spans Over 30 Inches To 42 Inches: One inch thick.
    - c) Spans Over 42 inches: One inch thick and provide Hafele or equal center supports.
- e. Backs: 1/4 inch thick panel product.
- f. Doors: 3/4 inch thick panel product.
- g. Drawer Sides, Backs, And Subfronts: 1/2 inch thick minimum panel product.
- h. Drawer Bottoms: 1/4 inch thick panel product.
- i. Separate Drawer Front:
  - 1) 8 Inches High And Less: 3/4 inch thick solid hardwood.
  - 2) More Than 8 Inches High: 3/4 inch panel product.
- . Hardboard Dividers: 1/4 inch thick panel product.
- k. Hardboard Shelves: 1/8 inch thick hardboard, smooth both sides.
- 5. Cabinet and Drawer Locks:
  - a. Install only on cabinets and drawers as shown on Contract Documents.
- 6. Install plastic grommets in cable access holes in countertops located as located on Contract Documents.

#### C. Finishes:

- 1. Factory Finishing:
  - a. Design Criteria:
    - 1) Applied before leaving factory.
    - 2) Factory-finish to match Owner selected sample as specified in Section 09 9324.
  - b. Color:
    - 1) LDS Cherry.

# 2.2 ASSESSORIES

- A. Manufacturers:
  - Manufacturer Contact List for Assessories:
    - a. Accuride, Santa Fe Springs, CA www.accuride.com.
    - b. Anybumper, Amite, LA www.Anybumper.com.
    - c. Blum Inc, Stanley, NC www.blum.com.
    - d. CompX National, Mauldin, SC www.nclnet.com.
    - e. Grass America Inc, Kernerville, NC www.grassusa.com.
    - f. Hafele America Co., Archdale, NC hafele.com.
    - g. Ives, Indianapolis, IN www.iveshardware.com.
    - h. Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com or Knape & Vogt Canada, Mississaugua, ON (905) 676-8972.
    - i. Olympus Lock Co, Seattle, WA www.olympus-lock.com.
    - j. Salice America Inc, Charlotte, NC www.saliceamerica.com.
    - k. Stanley, New Britain, CT www.stanleyhardware.com.

## B. Cabinet Hardware:

- Cabinet And Drawer Pulls:
  - a. Satin Chromium Plated brass / bronze core bow handles, 4 inches long minimum.
  - b. Type Two Acceptable Products:
    - 1) 4484 by Stanley.
    - 2) Equal as approved by Architect before installation. See Section 01 6200.
- 2. Cabinet And Drawer Locks:
  - a. General:
    - 1) Pin tumbler type suitable for location.
    - 2) Keying: Key each cabinet and drawer individually as shown on Contract Documents except as follows:
      - a) Key each cabinet and drawer within each Office alike.
      - b) Crosskey knife drawer in Serving Area so all other cabinet and drawer keys will open drawer.
    - Stamp keys with Room number and cabinet designation as shown on Signage Plan of Contract Drawings.
    - 4) Provide six (6) keys per cabinet.
  - b. Design Criteria:
    - 1) Barrel diameter: 7/8 inch
    - 2) Cylinder length: 7/8 inch

- 3) Key removable in locked or unlocked position.
- 4) Meet ANSI/BHMA A156.11 Grade 2 requirements.
- c. Type Two Acceptable Manufacturers:
  - 1) Advantage Plus cam lock by CompX National Lock.
  - 100DR/200DW N Series door and drawer lock by Olympus Lock Inc.
  - 3) Equal as approved by Architect before installation. See Section 01 6200.
- 3. Cabinet Adjustable Shelf Supports:
  - a. Either of following systems are acceptable, at Fabricator's option:
    - 32mm System: Casework Fabricator's standard.
    - 2) Traditional System:
      - a) Class Two Quality Standards: 255 and 256 by Knape & Vogt.
- 4. Cabinet Hinges:
  - a. Description:
    - 1) Cup Hinge (Concealed Hinge or European style).
    - 2) Steel, nickel-plated, full overlay, self closing with dowel, Mod 17.
  - b. Design Criteria:
    - 1) Doors 48 inches High or Less:
      - a) Two (2) hinges.
      - b) Hinge Opening: 165 degree minimum.
    - 2) Doors over 48 inches High:
      - a) Four (4) hinges.
      - b) Hinge Opening: 165 degree minimum.
  - c. Basis of Design: Model 329.03.558 with Model 329.73.510 mounting plate by Hafele.
    - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) Blum.
      - b) Grass America.
      - c) Hafele.
      - d) Knape & Vogt.
      - e) Salice.
- 5. Cabinet Inactive Leaf Catches:
  - a. Class Two Quality Standards:
    - 1) Elbow Catch No 2 by Ives.
- 6. Drawer Guides:
  - a. Keyboard / Pencil Drawers:
    - 1) Steel ball bearings, 45 lb load rating minimum.
    - 2) 3/4 extension, top mounting.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Series 2006 by Accuride.
      - b) Article 422.14.345 by Haffele.
      - c) Series KV8200 by Knape & Vogt.
  - b. Standard Drawers:
    - 1) Full extension, steel ball bearings, 100 lb load rating.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Series 3832-Classic by Accuride.
      - b) Article 422.04.552 by Haffele.
      - c) Series KV8400 by Knape & Vogt.
  - c. Lateral Files / Serving Area Drawers:
    - 1) Files/Drawers 30 inches wide and under:
      - a) Full extension, steel ball bearings, 150 lb load rating.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Series 4034 by Accuride.
        - (2) Article 422.17.550 by Haffele.
        - (3) Series KV8505 by Knape & Vogt.
    - 2) Files/Drawers over 30 inches wide:
      - a) Duty, full extension, steel ball bearings, 200 lbs load rating.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Series 3640-A by Accuride.
        - (2) Article 422.07.554 by Haffele.
        - (3) Series KV8800 by Knape & Vogt.

- C. Cabinet Door Bumpers:
  - 1. Description:
    - Polyurethane bumper to protect gypsum board from cabinet handle damage where cabinet handles hit gypsum wallboard surface.
  - 2. Design Criteria:
    - a. Clear.
    - b. Peel adhesion.
    - c. Size: 3/8 inch diameter x 1/8 inch thick.
  - 3. Type Two Acceptable Products:
    - a. WS-34 Cylindrical Soft Durometer Cabinet Bumper by Anybumper.
    - b. Equal as approved by Architect before installation. See Section 01 6200.

# 2.3 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

# SECTION 06 4115 ROSTRUM CASEWORK

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Rostrum casework as described in Contract Documents consisting of the following:
    - a. Chapel Pulpit (with adjustable lift mechanism).
    - b. Control Pedestal.
    - c. Lectern (Free Standing) for Primary Room.
    - d. Lectern (Table Top) for Relief Society.
    - e. Modesty Rail.
    - f. Ramp Landing Sidewall.
    - g. Riser Steps Sidewall.
    - h. Rostrum Riser Handrail (floor mounted).
    - i. Sacrament Table.
    - i. Wood Handrails and Handrail Brackets.

# B. Related Requirements:

- Section 05 5215: 'Stainless Steel Handrails' for floor mounted Rostrum Riser Handrail and Rostrum Ramp Handrail.
- 2. Section 06 1100: 'Wood Framing' for wall blocking required for Rostrum Casework.
- 3. Section 06 2001: 'Common Finish Carpentry Requirements':
  - a. Installation of Rostrum Casework.
- 4. Section 06 4001: 'Common Architectural Woodwork Requirements':
  - a. Approved Fabricators.
  - b. General standards for materials and fabrication of Architectural Woodwork.
  - c. Action Submittals for shop drawings from Fabricator.
  - d. Field Quality Control Submittals for field dimensions provided to Fabricator from Contractor.
- 5. Section 09 9324: 'Interior Clear-Finished Hardwood'.

## 1.2 REFERENCES

#### A. Association Publications:

- Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
  - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

#### B. Definitions:

- 1. Face Veneer: The outermost exposed wood veneer surface of a veneered wood door, panel, or other component exposed to view when the project is completed.
- 2. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
  - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
- 3. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.
- 4. Running Match: Each panel face is assembled from as many veneer leaves as necessary. Any portion left over from one panel may be used to start the next.

# C. Reference Standards:

- 1. International Electrotechnical Commission (IEC):
  - a. IEC 60529 (ed. 2.1 b:2001), 'Degrees of protection provided by enclosures (IP Code).
- . International Organization for Standards (ISO):
  - a. ISO 3746:2010, 'Acoustics Determination of sound power levels and sound energy levels of noise sources using sound pressure Survey method using an enveloping measurement surface over a reflecting plane'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- 1. Coordinate the efforts of the various trades affected by the Work of this Section.
- 2. Coordinate completion of 2x6 wall blocking for rostrum casework.
- 3. Coordinate completion of electrical and audio video wiring with rostrum casework.
- 4. Coordinate completion of rostrum casework.

#### B. Sequencing:

- 1. Install rostrum casework after following as been completed:
  - a. Adjacent millwork.
  - b. Adjacent walls and ceilings are finished.

#### 1.4 SUBMITTALS

# A. Action Submittals:

- 1. Shop Drawings:
  - a. As specified in as specified in Action Submittals in Section 06 4001 'Common Architectural Woodwork Requirements'.
- 2. Samples:
  - a. Interior Hardwood for Transparent Finish:
    - 1) Approval subject to Annual Review:
      - a) Prepare sample to match Control Sample available from Owner to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
      - b) Approval of sample by Owner will establish performance standard of stain to be used until next annual review.
    - 2) Design Criteria:
      - a) Provide 8 inch by 10 inch sample of Red Oak to match stain Control Sample provided by Owner.

#### B. Informational Submittals:

- 1. Source Quality Control Submittals:
  - a. Samples:
    - 1) Interior Hardwood for Transparent Finish:
      - a) Owner will provide Control Sample for finish.
- 2. Field Quality Control Submittals:
  - a. Field dimensions:
    - 1) Contractor Responsibility:
      - a) Provide field dimensions of Rostrum area to Approved Fabricator as specified in Field Quality Control Submittal in Section 06 4001 'Common Architectural Woodwork Requirements'.

# C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Final, executed copy of Warranty.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Assemble Rostrum Casework at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
  - 2. Protect Rostrum Casework from moisture and damage while in transit to job site.
  - 3. Report damaged materials received.
- B. Storage And Handling Requirements:
  - 1. Unload and store in secure place where it will be protected from moisture and damage and convenient to use.

# 1.6 WARRANTY

A. Manufacturer Extended Warranty:

ROSTRUM CASEWORK - 2 - 06 4115

 Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

# B. Adjustable Lift Mechanism:

1. Lift Manufacturer's warranty against defects in materials and workmanship.

# PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

#### A. Description:

- Rostrum casework consists:
  - a. Chapel Pulpit (with adjustable lift mechanism).
  - b. Control Pedestal.
  - c. Lectern (Free Standing) for Primary Room.
  - d. Lectern (Table Top) for Relief Society.
  - e. Modesty Rail.
  - f. Ramp Landing Sidewall.
  - g. Riser Steps Sidewall.
  - h. Rostrum Riser Handrail (floor mounted).
  - i. Sacrament Table.
  - j. Wood Handrails and Handrail Brackets.

# B. Design Criteria:

- AWS Custom Grade is minimum acceptable standard for materials, construction, and installation of architectural woodwork.
- 2. Interior Hardwood for Transparent Finish. Furnish factory-finish matching Owner selected sample for Rostrum Casework:
  - a. Design Criteria:
    - 1) Factory-finish to match Owner selected sample as specified in Section 09 9324.
  - b. Color:
    - 1) LDS Cherry.

## C. Materials:

- 1. Rostrum Casework as described in Contract Documents.
  - a. Material:
    - 1) Solid Wood: Plain sawn Red Oak.
    - 2) Paneling: Panel Product with plain sliced Red Oak veneer.
  - b. Rostrum Rail:
    - 1) Running match construction.
    - 2) Fabricator Option:
      - a) Option A: One (1) 3/4 inch 'A' face veneer panel product both sides.
      - Option B: Two (2) 1/2 inch 'A' face veneer one side panel product laminated together.
  - c. End (Wing) Supports:
    - 1) No butcher block (edge grain construction) permitted.
- 2. Wood handrails and brackets.

## D. Fabrication:

1. Following Architectural Woodwork Standards (AWS) for fabrication of Rostrum casework.

## 2.2 ACCESSORIES

- A. Adjustable Pulpit Mechanism:
  - 1. Description:
    - a. Lift Mechanism for raising and lowering pulpit / podium lecterns including but not limited to following components:
      - 1) Column assembly.
      - 2) Control box.
      - 3) Control cable.

- 4) Control relay assembly.
- 5) Lift Actuator.

# 2. Design Criteria:

- a. General:
  - 1) Identification:
    - Each unit shall have tag permanently attached giving Model Number and Manufacturer's name, phone number, and address.
  - 2) Service Life:
    - Estimated service life of Lift Mechanism shall be one (1) million cycles plus/minus ten (10) percent.
  - 3) Sound:
    - a) Lift mechanism must operate at not more than 48db(A) measured per ISO 3746.
- b. Dimension Requirements:
  - 1) Provide Lift Mechanism within lectern neck and engage not more than 18 inches and not less than less than 17 inches.
  - 2) Provide Lift Mechanism to fit inside lectern (size is based which Manufacturer provided original pulpit mechanism):
    - a) 8-3/4 to 9 inch square by 18 inch.
  - 3) Do not exceed 3 inches minimum or 6 inches maximum space from bottom of lectern to top of pulpit base.
- c. Safety switch assembly.
- d. Switches, condensers, etc, shall be only those supplied by Manufacturer.
- e. Surge Protector.

#### 3. Column Assembly:

- General:
  - 1) Construct Lift Mechanism with inner and outer column.
  - 2) Inner column must be fixed to base plate of Lift Mechanism.
  - 3) Connect outer column to inner column with system of roller bearings to provide vertical motion but limit lateral motion.
- b. Material:
  - 1) Construct inner and outer column dimensionally stable material for presence of variable humidity levels (typically aluminum).
  - Protect inner and outer column from oxidation with an electrolytic coating such as powder coat paint or anodize.

# 4. Control Box:

- a. General:
  - 1) Electrical components of unit shall be UL/ULC, CSA, and/or TUV listed or recognized where such listing or recognition is available.
  - 2) Actuator and power supply must meet requirements of IEC 60529 for IP51 protection.
  - 3) Cut-off mechanism must automatically reset after operation.
- b. Power Supply:
  - 1) Power supply for operating motor of actuator must be separate from actuator and Lift Mechanism.
  - 2) Power supply mains cable must be available with molded plug end for interface with standard outlets without use of adapters.
  - 3) Power supply must meet worldwide voltage and frequency requirements.

## 5. Control Cable:

- Separate interconnection cables used to connect screw actuator, control switch and power to power supply unit.
- Interconnection cables must be uniquely sized, keyed, and pinned so that incorrect connection to power supply unit cannot be completed.
- c. Locking mechanism must be supplied to prevent interconnection cables from being removed from the power supply without disabling lock mechanism.
- 6. Lifting Actuator:
  - a. Provide movable outer column with screw type actuator.
    - 1) Outer column must not be physically connected to screw type actuator.
  - b. Screw Type Actuator:
    - 1) Provide sealed and lubricated for life of actuator.
    - 2) Provide end of stroke limit switches contained with actuator.
    - 3) Provide brake mechanism to prevent screw from back driving under load.
    - 4) Actuator must extend and/or retract at minimum speed of 1/2 inch per second.
- 7. Safety Switch Assembly:
  - a. Provide adjustable cut-off mechanism to limit weight that Lift Mechanism can carry during extension:

ROSTRUM CASEWORK - 4 - 06 4115

- Lift Mechanism to carry total weight of 55 lb to 65 lb including weight of pulpit lectern and neck assembly.
- b. Provide adjustable cut-off mechanism to limit force that may be transmitted to an obstruction object during retraction:
  - Force should not exceed 3 lbs when measured between top of pulpit cabinet and front left corner of lectern.
- 8. Category Four Approved Product. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
  - a. Manufacturer Contact List:
    - 1) Mark Eaton LLC, American Fork, UT www.markeatonllc.com.
      - a) Contact Information: Mark Eaton (801) 756-5639.
    - P) Techna-Base, Inc., Pleasant Grove, UT.
      - a) Contact Information: Dewey Lundahl (801) 785-6477 or (801) 361-2289 (cell).
  - b. Approved Product:
    - 1) Mark Eaton:
      - a) Model LDS2005A by Mark Eaton.
    - 2) Techna-Base.
      - a) Model PL-120 (120 VAC) or Model PL-220 (220 VAC).

# 2.3 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

PART 3 - EXECUTION: Not Used

END OF SECTION

ROSTRUM CASEWORK - 5 - 06 4115

# SECTION 06 4313 WOOD STAIRS

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Stair treads and risers to:
    - a. Rostrum.
    - b. Platform.
    - c. Second Floor.
- B. Related Requirements:
  - 1. Section 05 5214: 'Steel Pipe and Tube Railings' for custom metal handrails.
  - 2. Section 06 1100: 'Wood Framing' for stair stringers.
  - 3. Section 06 1636: 'Wood Panel Product Sheathing'.
  - 4. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.
  - 5. Section 06 4001: 'Common Architectural Woodwork Requirements'.
  - 6. Section 06 4115: 'Rostrum Casework' for wood handrails at Rostrum.

# PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

#### A. Materials:

- 1. Treads:
  - a. 5/4 inch clear Douglas Fir or Southern Pine, or 1-1/8 inch thick high density particle board preformed stair tread.
  - b. Treads to have 1/2 inch radius at top outside edge.
- 2. Risers: 4/4 inch clear Douglas Fir or Southern Pine, or 3/4 inch plywood meeting requirements specified in Section 06 1636.

#### PART 3 - EXECUTION: Not Used

END OF SECTION

WOOD STAIRS - 1 - 06 4313

# SECTION 06 4512 ARCHITECTURAL WOODWORK WOOD TRIM

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Accordion folding partition hardwood jambs and trim.
  - 2. Casings, stops, handrails, and jambs.
  - 3. Chair rails.
  - 4. Fixed shelving not part of casework.
  - 5. Hardwood trim at light coves, speaker cabinets, etc,
  - 6. Hardwood base.
  - 7. Hardwood handrail at Rostrum Riser and Rostrum Ramp.
  - 8. Hardwood trim for wall covering.
  - 9. Hardwood trim and nosing at Cultural Center Platform.
  - 10. Organ chamber hardwood trim and access panel.
  - 11. Wood trim at ceiling trim.

# B. Related Requirements:

- 1. Section 05 5215: Stainless steel used in Rostrum Riser Handrail and Rostrum Ramp Handrail.
- 2. Section 06 1100: 'Wood Framing' for wall blocking required for Wood Trim.
- 3. Section 06 2001: 'Common Finish Carpentry Requirements':
  - Installation of Wood Trim.
  - b. Grille Material and Mesh Reinforcing.
  - c. Coat hats and hooks.
- 4. Section 06 2210: Remaining Wood Trim.
- 5. Section 06 4001: 'Common Architectural Woodwork Requirements':
  - a. Approved Fabricators.
  - b. General standards for materials and fabrication of Architectural Woodwork.
- 6. Section 08 1429: Interior Flush Wood Doors.
- 7. Section 09 9324: 'Interior Clear-Finished Hardwood'.
- 8. Section 10 2233: 'Accordion Folding Partitions'.

## 1.2 REFERENCES

#### A. Association Publications:

- Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
  - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

#### B. Definitions:

- 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
  - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
- 2. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.
- 3. Running Trim: Generally combined in the term "standing and running trim" and refers to random, longer length trims delivered to the jobsite (e.g., baseboard, chair rail, crown molding).

#### 1.3 SUBMITTALS

#### A. Action Submittals:

- 1. Shop Drawings
  - a. Include materials used, standing and running trim profiles, joint details, and hardware.

- 2. Samples:
  - a. Interior Hardwood for Transparent Finish:
    - Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
    - 2) Design Criteria:
      - a) Provide 8 inch by 10 inch sample of Red Oak to match Owner provided stain color selected for Project.
      - b) Control Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.

#### 1.4 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Manufacturers:
  - 1. Approved Fabricators. See Section 06 4001 for Approved Fabricators.
- B. Performance / Design Criteria: Conform to requirements of Section 06 4001 'Common Architectural Woodwork Requirements'.
  - 1. Glue: Waterproof and of best quality.
  - 2. Factory-finish to match Owner selected sample as specified in Section 09 9324.
- C. Architectural Woodwork Wood Trim:
  - 1. Interior Hardwood For Transparent Finish:
    - a. Design Criteria:
      - 1) Solid wood shall be plain sawn Red Oak.
      - 2) Paneling shall be panel product with plain sliced Red Oak veneer.
      - 3) Finish to match Owner selected sample as specified in Section 09 9324.
      - Color:

b.

- 1) LDS Cherry.
- 2. Interior Wood For Opaque, Painted Finish:
  - a. Applies to ceiling trim only.
  - b. Solid wood shall be any species allowed by AWS Custom grade.
- D. Shelves:
  - 1. Conform to applicable requirements of Sections 06 4001 and 06 4114.
  - Use 3/4 inch Kortron or Melamine faced Panel Product with hot glued 3 mm thick PVC edge banding with eased edges. Apply banding on exposed edges with one inch return onto unexposed edges. Edge banding color to match Panel Product.

# 2.2 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

# PART 3 - EXECUTION Not Used

END OF SECTION

# SECTION 06 6001 MISCELLANEOUS PLASTIC FABRICATIONS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But not Installed Under This Section:
  - 1. Furnish window stools as described in Contract Documents.
  - 2. Furnish Dressing Room benches as described in Contract Documents.

#### B. Related Requirements:

- 1. Section 06 2001: 'Common Finish Carpentry Requirements' for:
  - a. Installation of Window Stools.
  - b. Installation of Dressing Room Benches.
- 2. Section 06 4001: 'Common Architectural Woodwork Requirements' for Approved Fabricators.

#### 1.2 REFERENCES

#### A. Definitions

- 1. High Density Polyethylene (HDPE): A strong, relatively opaque form of polyethylene having a dense structure with few side branches off the main carbon backbone. Polyethylene is a member of the important family of polyelefin resins.
- 2. Solid Surface: Solid surface materials are manufactured from polymeric materials. Granules may also be added to enhance the color effects. Solid surface materials are non-porous and homogeneous, with the same composition throughout the thickness of the solid surface material. They are capable of being repaired, renewed to the original finish and fabricated into continuous surfaces with inconspicuous seams.

## B. Reference Standards:

- 1. American National Standards Institute/International Cast Polymer Alliance:
  - a. ANSI/ICPA SS-1-2001, 'Performance Standard for Solid Surface Materials'.

## 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature.
    - b. Color selections.

# 1.4 WARRANTY

- A. Manufacturer Extended Warranty:
  - 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

- A. Manufacturers:
  - Acrylic Solid Surface:
    - a. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.

- 1) Corian by DuPont Co, Wilmington, DE. Contact Steve Finch at (314) 941-5179 or email stephen.m.finch@dupont.com.
- 2) Staron Solid Surfacing by Cheil Industries / Samsung Chemical USA, La Mirada, CA www.staron.com.
- 3) Hanex Solid Surfaces by Hanwha L&C Surfaces US HQ, Atlanta, GA www.hanwhasurfaces.com.
- 4) LG Hi-Macs Solid Surfacing by LG Solid Source LLC, Peoria, AZ www.lgcreate.com.
- 5) 'Gibralter Solid Surface' by Wilsonart International Inc, Temple, TX www.wilsonart.com.
- 2. High Density Polyethylene (HDPE):
  - a. Type Two Acceptable Products:
    - 1) Comtec Industries, Moosic, PA www.comtecindustries.com.
    - 2) PSiSC, Columbia, SC www.psisc.com.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

#### B. Materials:

- 1. Acrylic Solid Surface Window Stools:
  - a. Design Criteria:
    - 1) Meet requirements of ANSI/ICPS SS-1.
  - b. General:
    - 1) 1/2 inch thick 100 percent acrylic polymer.
  - Approved Colors: As selected by Architect from Manufacturer's standard solid (white or off-white only)
    colors.
    - 1) Glacier White by Corian.
    - 2) Bisque by Corian.
    - 3) Cameo White by Corian.
    - 4) Vanilla by Corian.
- 2. High Density Polyethylene (HDPE) Bench Seat:
  - a. 1-1/2 inches thick.
  - b. Color selected to closely match color of toilet partitions.

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# DIVISION 7 - THERMAL AND MOISTURE PROTECTION:

07 1000	Dampproofing and Waterproofing
07 1113	Bituminous Dampproofing
07 2000	Thermal Protection
07 2113	Board Insulation
07 2116	Blanket Insulation
07 2123	Loose-fill insulation
07 2419	
07 2613	•
07 2616	·
07 2719	Plastic Sheet Air Barriers
07 3000	Steep Slope Roofing
07 3113	Asphalt Shingles
07 6000	Flashing and Sheet Metal
07 6210	Galvanized Steel Flashing and Trim
07 6220	Stainless Steel Flashing and Trim
07 6310	Steep Slope Roof Flashing
07 6311	Metal Soffit Panels
07 6312	Perforated Metal Soffit
07 6322	Steel Fascia
07 7000	Roof and Wall Specialties and Accessories
07 7123	Manufactured Gutters and Downspouts
07 7226	Ridge Vents
07 9000	Joint Protection
07 9213	Elastomeric Joint Sealants
07 9219	Acoustical Joint Sealants

# SECTION 07 1113 BITUMINOUS DAMPPROOFING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish and apply bituminous dampproofing to exterior of font foundation walls and top of associated footings as
    described in Contract Documents.

# 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product literature or cut sheet products provided.

# 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Maintain dampproofing at 40 deg F or above before application.

# 1.4 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not apply when ambient temperature is below 40 deg F, surface temperature is below 33 deg F, or when rain is expected before applied dampproofing will dry.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Bituminous Damproofing:
  - 1. Type Two Acceptable Products:
    - a. Ecomul-11 by Epro Waterproofing Systems, Derby, KS www.eproserv.com.
    - b. Henry 788 by Henry Company, El Segundo, CA www.henry.com.
    - c. Karnak 100 by Karnak Chemical Corp, Clark, NJ www.karnakcorp.com.
    - Sealmastic Asphalt Emulsion Dampproofing Type I by W R Meadows, Hampshire, IL www.wrmeadows.com.
    - e. Equal as approved by Architect before application. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 APPLICATION

- A. Spray Application:
  - 1. Spray to a thickness of 10 mils minimum.
- B. Brush / Roller Application:
  - 1. Apply two coats of dampproofing at rate recommended by Manufacturer.

- 2. Apply coats in cross hatch method so coats are applied perpendicular to each other.
- 3. Before applying second coat allow first coat to dry in accordance with Manufacturer's recommendations.
- C. Apply dampproofing to cover area from 6 inches below finish grade line down to and including top of footings.
- D. Do not backfill against bituminous dampproofing for twenty-four (24) hours after application.

END OF SECTION

# SECTION 07 2113 BOARD INSULATION

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install board insulation on interior side of perimeter foundation walls as described in Contract Documents

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Flame Spread: The propagation of flame over a surface.
  - 2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
  - 3. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C518-15, 'Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus'.
    - b. ASTM C578-17, 'Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation'.
    - c. ASTM C1289-17, 'Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board'
    - d. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - e. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.
  - 2. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Tests for Surface Burning Characteristics of Building Materials' (10th Edition).

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - Installation of Polyethylene Film Vapor Retarder as specified in Section 07 2616 with Type 1 Insulation (Below Grade).
- B. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 01 3100:
    - Schedule pre-installation conference prior to commencement of installing insulation with Installer and Manufacturer's Representative if available.
    - b. In addition to agenda items specified in Section 01 3100, review following:
      - 1) Review installation procedures.
      - 2) Review coordination of work with related and adjacent work.
      - 3) Review special details and flashing.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Insulation shall be manufactured to be in compliance with International Code Council (IBC) or other applicable building codes.
  - 2. Fire-Test-Response Characteristics: As determined by test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Insulation shall have Class A flame spread rating in accordance with ASTM E84 or UL 723.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).

- b) Flash point: None.
- 3. Qualifications:
  - a. Installer: Firm which has at least three (3) years experience in work of type required by this specification.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - Materials shall be delivered in original, unopened packages with labels intact. Exercise care to avoid damage during unloading.
  - 2. Deliver materials in sufficient quantities to allow continuity of work.
- B. Storage And Handling Requirements:
  - Store, protect and handle materials in accordance with Manufacturer's recommendations to prevent damage, contamination and deterioration. Keep material free of dirt and other foreign matter.
  - 2. Store in cool, dry area away from sources of heat, flame, ignition and strong oxidizing agents.
  - 3. Following Manufacturer's instructions for protection when handling and cutting insulation.

#### 1.6 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's Insulation Warranty.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERES

- A. Manufacturer Contact List:
  - 1. Owens Corning, Toledo, OH www.owens-corning.com.
  - 2. Dow Chemical, Midland, MI www.dow.com or Dow Canada, Sarnia, ON www.dow.com.

# 2.2 MATERIALS

- A. Board Insulation:
  - 1. Description:
    - a. Extruded polystyrene foam insulation for use above and below grade.
  - 2. Design Criteria:
    - a. Meet requirements of ASTM C578, Type IV.
    - b. Close-cell foam insulation.
    - c. Meet requirements of ASTM E84 or UL 723 for 'surface burning characteristics of building materials'.
    - d. Perimeter Insulation:
      - 1) Butt type, minimum RSI 1.7 (R-10), 2 inches thick by 24 inches by standard length.
  - 3. Type One Acceptable Products:
    - a. Foamular 250 by Owens Corning.
    - b. Styrofoam Scoreboard Extruded Polystyrene Foam Insulation by Dow Chemical.
    - c. Equal as approved by Architect before bidding. See Section 01 6200.

# 2.3 ACCESSORIES

- A. Fasteners:
  - 1. Tapping screws with washers.
    - a. As recommended by Manufacturer.

BOARD INSULATION - 2 - 07 2113

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Prior to all work of this section, carefully inspect installed work of all other trades and verify that all such work is complete to point where installation may properly commence.
  - 2. Verify insulation may be installed in accordance with original design an manufacturer's recommendations
  - 3. Discrepancies:
    - a. In event of discrepancy, immediately notify Architect.
    - Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

# 3.2 INSTALLATION

- A. General: Install insulation in compliance with International Code Council (IBC) or other applicable building codes and in accordance with Manufacturer's current recommendations.
- B. Type 1 Insulation (Below Grade):
  - 1. Remove ties and concrete protrusions that would keep insulation from fully contacting foundation wall face.
  - 2. Install against interior side of perimeter foundation walls extending downward from top of slab 48 inches or to top of footing, whichever is less. Install using 3/8 inch beads of adhesive at 12 inches on center vertically and at each vertical and horizontal joint to completely seal insulation.

# 3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Upon completion of installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found not complying with contract document requirements at no additional cost to the Owner.

#### 3.4 CLEANING

- A. Waste Management:
  - 1. Remove from site debris resulting from work of this Section.

**END OF SECTION** 

BOARD INSULATION - 3 - 07 2113

# SECTION 07 2116 BLANKET INSULATION

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install faced thermal and acoustic batt insulation as described in Contract Documents.
  - 2. Quality of insulation used in speaker enclosures.
- B. Related Requirements:
  - Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for furnishing and installing of insulation in hollow metal door frames.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C665-12, 'Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing'.

# 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Insulation shall be manufactured and installed in compliance with International Building Code (IBC) or other applicable building codes.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Insulation:
    - a. Type One Acceptable Manufacturers:
      - 1) Certainteed Corp, Valley Forge, PA www.certainteed.com.
      - 2) FiberTEK, Salt Lake City, UT www.fibertekinsulation.com.
      - 3) Guardian Fiberglass, Greer, SC www.guardianbp.com.
      - 4) Johns Manville, Denver, CO www.im.com.
      - 5) Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
      - 6) Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
      - 7) Thermafiber, Wabash, IL www.thermafiber.com.
    - b. Equal as approved by Architect before bidding. See Section 01 6200.

# B. Materials:

- 1. Thermal And Acoustic Insulation:
  - a. Unfaced Insulation: Meet requirements of ASTM C665, Type I.
    - 1) Support at trussed rafters:
      - a) Provide support at trussed rafters where insulation is not enclosed by structure or drywall.
      - b) Provide stings/wires which run perpendicular to framing and attach at each trussed rafter and to framing at 32 inches O.C. minimum and where batt ends adjoin each other.

or

c) Class Two Quality Standard: Simpson Strong Tie IS Insulation Supports with 14 gauge carbon steel, spring wire and mitered tips for 16 inch O.C. and 24 inch O.C. spacing.

- b. Order insulation by 'R' factor rather than 'U' factor, rating, or thickness, either 16 or 24 inches wide according to framing spacing.
- c. 'R' Factor Required:
  - 1) Acoustically Insulated Ceilings:
    - ) Enclosed Spaces: Fill framed cavity with batt of appropriate thickness.
    - b) Unenclosed Spaces: R19.
  - 2) Wood Wall Stud Framing:

R11	3-1/2 inches deep
R19	5-1/2 inches deep
R26	7-1/2 inches deep

## 3) SCL Wall Framing:

R26	7*1/4 inches deep
R32	9*1/4 inches deep
R38	11*1/4 inches deep

- 4) Thermally Insulated Ceilings / Roof:
  - a) R49 Standard.

#### 2.2 ACCESSORIES SYSTEMS

# A. Attic Baffles:

- 1. Design Criteria:
  - a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.
- 2. Type One Acceptable Manufacturers:
  - a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA www.dciproducts.com.
  - b. Equal as approved by Architect before bidding. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

## A. General:

- 1. Leave no gaps in insulation envelope.
- 2. If two layers of insulation are used to attain required 'R' factor, only layer towards interior of building shall have facing.
- 3. Provide minimum clearance around recessed lighting fixtures as approved by local code.

# B. In Framing:

- 1. Install insulation behind plumbing and wiring, around duct and vent line penetrations, and in similar places.
- 2. Fit ends of batts snug against top and bottom plates.
- 3. Fit batts snug against stud framing at each side.
- 4. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material as approved by Architect before bid.

# C. Attic Baffles:

- 1. Install in accordance with manufacturer's instructions.
- 2. Install baffles between trusses or rafters and underside of roof sheathing as shown on Contract Drawings.
- 3. Install baffles to prevent insulation from blocking ventilation airflow from soffit.

# **END OF SECTION**

BLANKET INSULATION - 2 - 07 2116

# SECTION 07 2123 LOOSE-FILL INSULATION

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install loose-fill insulation within overbuild areas as described in Contract Documents.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Flame Spread: The propagation of flame over a surface.
  - 2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
  - 3. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.

#### B. Reference Standards:

- ASTM International:
  - a. ASTM C518-15, 'Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus'.
  - b. ASTM C764-11, 'Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation'.
  - c. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - d. ASTM E136-16a, 'Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature describing products to be used, showing compliance with specified requirements.
    - b. Manufacturer's storage and handling requirements and recommendations.
    - c. Manufacturer's installation instructions.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Insulation shall be manufactured to be in compliance with International Code Council (IBC) or other applicable building codes.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
    - a. Labels to identify reference standards, type and class as applicable, minimum net weight of insulation, coverage, "R" values, and required warning statements.
- B. Storage And Handling Requirements:
  - 1. Protect from physical damage and from becoming wet, soiled, or covered with ice or snow.
  - 2. Provide dry location with adequate ventilation for storage, not subject to open flames or sparks, and permitting easy access for inspection and handling.
  - 3. Store materials in dry locations with adequate ventilation, free from water, and in such a manner to permit easy access for inspection and handling
  - 4. Comply with Manufacturer's recommendations for handling, storage, and personal protection during installation.

#### PART 2 - PRODUCTS

# 2.1 SYSTEMS

#### A. Manufacturers:

- Insulation:
  - a. Type One Acceptable Manufacturers:
    - 1) Certainteed Corp, Valley Forge, PA www.certainteed.com.
    - 2) FiberTEK, Salt Lake City, UT www.fibertekinsulation.com.
    - 3) Guardian Fiberglass, Greer, SC www.guardianbp.com.
    - 4) Johns Manville, Denver, CO www.jm.com.
    - 5) Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
    - 6) Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
  - b. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Materials:

- L. Loose-Fill Insulation:
  - a. Blown Insulation:
    - 1) Fiber glass.
    - Comply with requirements of ASTM C764, Type I or II, non-combustible when tested in accordance with ASTM F136.

# 2.2 ACCESSORIES SYSTEMS

- A. Attic Baffles:
  - 1. Design Criteria:
    - a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.
  - 2. Type One Acceptable Manufacturers:
    - a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA www.dciproducts.com.
    - b. Equal as approved by Architect before bidding. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Inspection:
    - a. Examine substrate and verify framing is suitable for installation of insulation:
    - b. Verify that mechanical and electrical services have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
    - c. Notify Architect of unsuitable conditions in writing.
    - d. Do not install insulation over unsuitable conditions:
      - 1) Commencement of Work by installer is considered acceptance of substrate.

## 3.2 INSTALLATION

- A. General:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Do not blow insulation into electrical devices and vents.
  - 3. Provide minimum clearance around recessed lighting fixtures as approved by local code.
- B. Attic Baffles:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Install baffles between trusses or rafters and underside of roof sheathing as shown on Contract Drawings.
  - 3. Install baffles to prevent insulation from blocking ventilation airflow from soffit.

## 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to the following:
  - Correct any work found defective or not complying with contract document requirements at no additional cost to Owner.

## 3.4 PROTECTION

- A. Protect installed products until project completion.
- B. Repair or replace damaged products.

## 3.5 CLEANING

- A. Waste Management:
  - 1. Disposal of rubbish, debris, and packaging materials in approved manner.

## END OF SECTION

LOOSE-FILL INSULATION - 3 - 07 2123

## **SECTION 07 2419** WATER-DRAINAGE EIFS

## PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Includes But Not Limited To:
  - 1. Furnish and install drainage-type PB EIFS system as described in Contract Documents, including sealants.
- Related Requirements:
  - Section 06 1636: 'Wood Panel Product Sheathing'. Section 06 1643: 'Gypsum Sheathing'.

  - Sections under 07 6000 heading: 'Flashing And Sheet Metal' for furnishing and installation of step and roof diverter flashing.

#### 1.2 REFERENCES

#### Definitions:

- Base Coat: Any or all layers of plaster in place prior to application of finish coat.
- Drainage Medium: Means that allows incidental moisture to drain to exterior of EIFS wall cladding.
- EIFS (Exterior Insulation And Finish System: Nonstructural, nonload-bearing, exterior wall cladding systems that consist of an insulation board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat: and a textured protective finish coat.
- Finish: Final layer of plaster applied over basecoat. 4.
- Gypsum Sheathing: Gypsum board used as backing for exterior surface materials. 5
- Impact Resistant: Flying debris will not puncture. 6.
- Insulation Board: Expanded polystyrene (EPS) insulation board, which is affixed to the substrate. 7.
- Reinforcing Mesh: Glass fiber mesh used to reinforce the base coat and to provide impact resistance.
- Water Resistive Barrier: Interior material behind EIFS that is intended to resist liquid water that has penetrated behind the FIFS.

## Reference Standards:

- American National Standards Institute / Factory Mutual Resource Corporation:
  - ANSI FM 4880:2010, 'Class 1 Fire Rating of Insulated Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings And Exterior Finish Systems'.
- 2. ASTM International:
  - ASTM C150/C150M-17, 'Standard Specification for Portland Cement'.
  - ASTM C578-17, 'Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.'
  - ASTM C1382-15, 'Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints'.
  - ASTM E330/E330M-14, 'Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference'.
  - ASTM E2273-03(2011), 'Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies'.
  - ASTM E2486/E2486M-13. 'Standard Test Method for Impact Resistance of Class PB and PI Exterior f. Insulation and Finish Systems (EIFS)'.
  - ASTM E2568-17a, 'Standard Specification for PB Exterior Insulation and Finish Systems'.
  - ASTM E2570/E2570M-07(2014), 'Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage'.
- International Code Council (ICC):
  - AC212, 'Acceptance Criteria For Water-Resistive Coatings Used As Water-Resistive Barriers' (June 2011).
  - AC219, 'Acceptance Criteria For Exterior Insulation And Finish Systems' (October 2009). b.
  - AC235, 'Acceptance Criteria for EIFS Clad Drainage Wall Assemblies' (October 2009).

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in MANDATORY pre-installation conference.
  - 2. Schedule meeting for after installation of foam and reinforcing mesh, but before flashing of openings.
  - 3. In addition to agenda items specified in Section 01 3100, review following:
    - During Conference, apply flashing at one window and associated back-wrapping at same location. Examine foam and reinforcing installation as well.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide Manufacturer's product data sheets describing products to be used.
    - b. Provide Manufacturer's storage and handling, preparation, and installation requirements.
    - c. Color selection.
  - 2. Shop Drawings:
    - Provide Manufacturer's details and recommended sealant application and details for flashing of drainage EIFS assembly.
    - b. Show wall layout, connections, details, expansion joints and installation sequence.
  - 3. Samples:
    - a. Field created sample of each color and texture to be used. Make sample with same tools and techniques to be used on Project.
      - 1) Acceptable sample panel to be stand alone panel and not part of Work.
      - 2) Sample to be comprised of all wall assembly components including substrate, insulation board, Base Coat, Reinforcing Mesh, primer (if specified), Finish Coat, and typical sealant/flashing conditions.
- B. Informational Submittals:
  - Certificate:
    - a. Sealant Manufacturer's certificate of compliance with ASTM C1382.
  - 2. Test And Evaluation Reports:
    - a. Provide Manufacture's applicable code compliance report.
  - 3. Qualification Statements:
    - a. Letter from EIFS Manufacturer certifying level of training and experience of Installer.
    - b. System Manufacturer's approval of Installer.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance, cleaning, and repair instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature.
        - b) Color selection.
        - c) Shop Drawings.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall be recognized for intended use by applicable building codes.
- B. Qualifications:
  - Installers:
    - a. Installer shall be experienced and competent in installation EIFS systems and have performed at least ten (10) installations of similar size, scope, and complexity in each of the past five (5) years and be approved and listed applicator by EIFS Manufacturer.

C. Single Source Responsibility: All EIFS materials shall be from a single manufacturing source, or listed as an approved source.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact. Protect during transportation to avoid physical damage.
  - 2. Upon arrival, materials shall be inspected for physical damage, freezing, or overheating. Questionable materials shall not be used.
- B. Storage And Handling Requirements:
  - 1. Store in cool, dry location, out of direct sunlight and weather, and at temperatures above 40 deg F or greater than 110 deg F and remain so for twenty four (24) hours thereafter.
  - 2. Stack insulation board flat, fully supported off the ground and protected from direct exposure to the sun.

## 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Ambient air temperature shall be 40 deg F minimum and rising at time of installation and remain at 40 deg For above for twenty four (24) hours minimum after application.
  - 2. Ambient air temperature shall not exceed 120 deg F within twenty four (24) hours of application.
  - 3. Do not install system during inclement weather conditions, excessive wind or rain.

## 1.8 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's ten (10) year guarantee that system shall be free from defects that will affect its weather resistance.
  - 2. Installer Warranty: Installer shall warranty project against workmanship and installation for five (5) years.

#### PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Class One Quality Standard. See Section 01 6200.
    - a. BASF Senergy Senerflex Channeled Adhesive Design.
    - b. Dryvit Outsulation Plus MD.
    - c. Parex Standard Water Master Drainage.
    - d. Master Wall Rollershield Drainage System.
  - 2. Approved Manufacturers:
    - a. BASF Wall Systems, Jacksonville, FL www.senergy.basf.com.
    - b. Dryvit, West Warwick, RI www.dryvit.com.
    - c. Master Wall Inc, Midland, GA www.masterwall.com.
    - d. Parex, Anaheim, CA www.parex.com.
    - e. STO Finish Systems Div, Atlanta, GA www.stocorp.com.

#### B. Description:

- Drainage type Exterior Insulation and Finish System (EIFS) consisting of Adhesive to create drainage planes, Expanded Polystyrene Insulation (EPS) Board, Base Coat with embedded Reinforcing Fabric Mesh, and Finish Coat. System is installed over drainage track or back wrapped weep holes and applied over glass mat gypsum sheathing or wall sheathing.
- 2. Style / pattern / color as selected by Architect or Owner's Representative.

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## C. Design Criteria:

- 1. EIFS shall be constructed such that it meets performance characteristics required in ASTM E2568.
- 2. System to meet the performance and testing requirements of the International Code Council (ICC) Acceptance Criteria AC212 and AC235.
- 3. Design Wind loads:
  - Withstand positive and negative wind loads as specified by Building Code and tested by ASTM E330/E330M.
- 4. Drainage Medium to comply with requirements of ASTM E2273.
- Substrate Systems:
  - a. Engineered to withstand applicable design loads as required by IBC Chapter 16 including required safety factor.
  - b. Maximum deflection of substrate system under positive or negative design loads shall not exceed L/240 of span except as otherwise approved in writing by EIFS manufacturer prior to installation.
  - c. Substrate dimensional tolerance: Flat within 1/4 inch in any 4 feet radius.
  - d. Surface irregularities: Sheathing not over 1/8 inch; masonry not over 3/16 inch.
- 6. Impact Resistance Classification: EIFS shall be classified in accordance with ASTM E2486/E2486M classification and impact ranges as follows:
  - a. Standard Impact Resistance:
    - 1) Impact Range: 25-49 in-lbs.
    - 2) Minimum Tensile Strength: 150 lbs/in.
  - b. High Impact Resistance:
    - 1) Impact Range: 90-150 in-lbs.
    - 2) Minimum Tensile Strength: 300 lbs/in.
- Insulation Board: Meet requirements of ASTM C578, nominal 1 lb per cu ft aged expanded polystyrene by EIFS Manufacturer.
- 8. Portland Cement: Shall be Type I or II, meeting ASTM C150/C150M, white or gray in color, fresh and free of lumps.
- 9. Weather Resistance:
  - a. EIFS with drainage shall have an average minimum drainage efficiency of ninety (90) percent when tested in accordance of requirements of ASTM E 2273.
  - b. Water-resistive barrier shall comply with IBC Section 1404.2 or ASTM E2570/E2570M.

#### D. Materials:

- 1. General:
  - a. Acceptable substrate:
    - 1) Gypsum Sheathing: See Section 06 1643: 'Gypsum Sheathing'.
    - 2) Oriented Strand Board (OSB): See Section 06 1636: 'Wood Panel Product Sheathing'.
    - 3) Plywood: See Section 06 1636: 'Wood Panel Product Sheathing'.
  - b. The configuration of the water resistive barrier, drainage plane and flashing and EIFS materials, must allow for the egress of incidental moisture.
  - c. Inclined surfaces shall follow the guidelines listed below:
    - 1) Minimum slope: 6 inch of vertical rise in 12 inches of horizontal run.
    - 2) For sloped surfaces, run of slope shall be a maximum of 12 inches.
    - 3) Usage not meeting above criteria shall be approved by EIFS Manufacturer prior to installation.
  - d. Building interior shall be separated from insulation board by 1/2 inch of gypsum board or equivalent fifteen (15) minute thermal barrier.
- 2. Base Coat:
  - a. Manufacturer's standard.
- 3. Drainage Track:
  - a. Standard of EIFS Manufacturer.
- 4. Finish Coat:
  - One hundred (100) percent acrylic, factory-mixed, elastomeric, flexible coating with integral color and texture.
- 5. Liquid Applied Water Resistive Barrier:
  - a. Apply liquid applied water resistive barrier over all seams of sheathing and embed sheathing tape.
  - b. Then spray or roll apply additional liquid applied water resistive barrier over all sheathings and substrates in number of coats and constancy as per Manufacturer's requirements and recommendations to achieve coverages as required.
- 6. Insulation Board:
  - a. At system termination, completely encapsulate insulation board edges by mesh reinforced base coat, substrate or drainage track (limited to terminations at foundation).
  - Maximum thickness of insulation board shall be in accordance with applicable building codes and EIFS manufacturer requirements.

- 7. Insulation Board Adhesive: Standard of EIFS Manufacturer.
- 8. Water:
  - a. Clean, drinkable, and free of foreign matter.

## 2.2 ACCESSORIES

- A. Flashing:
  - 1. Flashing shall be continuous and watertight.
  - 2. Flashing shall be designed and installed to prevent water infiltration behind the EIFS.
- B. Expansion Joints: Continuous expansion joints shall be installed at the following locations in accordance with Manufacturer's recommendations:
  - 1. At building expansion joints.
  - 2. At substrate expansion joints.
  - 3. At floor lines in wood frame construction.
  - 4. Where EIFS panels abut one another.
  - 5. Where EIFS abuts other materials.
  - 6. Where significant structural movement occurs, such as the following:
    - a. Changes in roof line.
    - b. Changes in building shape and/or structural system.
    - c. Where substrate changes.
  - 7. Substrate movement and expansion and contraction of EIFS and adjacent materials shall be taken into account in design of expansion joints, with proper consideration given to sealant properties, installation conditions, temperature range, coefficients of expansion of materials, joint width to depth ratios, and other material factors. Minimum width of expansion joints shall be as follows:
    - a. 1/2 inch where EIFS abuts other materials.
    - b. 3/4 inch EIFS abuts the EIFS.
- C. Mechanical Fasteners:
  - 1. Wood Framing:
    - a. Type W bugle head screws with 1-1/2 inch diameter washer and 5/8 inch minimum penetration into framing.
- D. Reinforcing Mesh:
  - Standard Mesh: Balanced, open weave treated glass fiber mesh by EIFS Manufacturer, 4 oz per sq yd minimum weight
  - 2. High Strength Mesh: A balanced, open weave treated glass fiber mesh by EIFS Manufacturer made for high impact areas, 20 oz per sq yd minimum.
- E. Sealants:
  - 1. Quality Standard. See Section 01 6200:
    - a. Silicone by Dow or GE as acceptable to EIFS Manufacturer.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Before application, inspect substrate and flashing for compliance with Contract Documents and with EIFS Manufacturer's printed requirements.
  - 2. Verify that step flashing and roof diverters have been installed properly for 'roof to wall' conditions.
  - 3. Notify Architect of unsuitable conditions in writing.
    - a. Do not install material over unsuitable conditions.
  - 4. Commencement of Work by installer is considered acceptance of substrate.

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## 3.2 PREPARATION

- A. Protect adjoining work and property during installation.
- B. Clean surfaces thoroughly prior to installation.
- C. Prepare substrate to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion using methods recommended by the Manufacturer for achieving best results.
- D. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.

## 3.3 INSTALLATION

#### A. General:

- 1. Install drainage components required by Manufacturer's system if not incorporated into other elements of system.
- B. Liquid Applied Water Resistive Barrier:
  - Verify substrate is dry, clean, sound, and free of releasing agents, paint, or other coatings prior to installation of fluid applied water resistive barrier.

## C. Insulation Board:

- 1. Follow Manufacturer's written instruction for installation of Insulation Board.
- Apply insulation board horizontally in running bond pattern with joints staggered in relation to substrate joints and staggered and interlocked at corners.
- 3. Attach board to substrate with mechanical fasteners where required by EIFS Manufacturer.
- 4. Sand high spots to create smooth surface.

#### D. Base Coat And Reinforcing:

- 1. Apply base coat to all exposed insulation board. Embed one (1) layer of high strength mesh with edges abutted and material smoothed out until completely embedded in adhesive. Allow to cure for twenty-four (24) hours.
- 2. Apply base coat over cured, reinforced base coat. Embed one (1) layer of standard reinforcing mesh overlapping edges 2-1/2 inches minimum. Smooth out material until completely embedded and allow twenty-four (24) hours to cure.

## E. Finish Coat:

- 1. Correct surface irregularities, such as trowel marks and board lines.
- Apply finish coat with stainless steel trowel using sufficient manpower and equipment to insure continuous wet edge to prevent cold joint, scaffolding lines, etc. Same type of equipment and techniques shall be used by all applicators. Finish shall closely match samples prepared for Architect.
- F. Apply sealants as required by EIFS Manufacturer.

#### G. Tolerances:

- 1. Deflection of the substrate systems shall not exceed L/240 times the span.
- 2. Substrate shall be flat within 1/4 inch in 4 feet radius.

## 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner

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## 3.5 CLEANING

A. Remove debris resulting from work of this Section and clean adjacent surfaces.

## 3.6 PROTECTION

A. Protect from inclement weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

END OF SECTION

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## SECTION 07 2613 ABOVE-GRADE VAPOR RETARDERS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install polyimide film vapor retarder on framed walls and ceilings as described in Contract Documents

## 1.2 REFERENCES

#### A. Definitions:

- 1. Fire Hazard Classification:
  - a. Flame Spread: The propagation of flame over a surface.
  - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
  - c. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.
- 2. General Classification of Building Materials with Respect to Water Vapor Permeance:
  - a. Vapor Barrier Materials: 0.1 perm or less (rubber membranes, polyethylene film, glass, aluminum foil, sheet metal, foil-faced insulating sheathings)
  - b. Vapor Retarder Materials: 0.1-1 perm (asphalt-backed kraft paper, vapor retarding paint, oil-based paints, vinyl wall coverings, extruded polystyrene, plywood, OSB).
  - c. Semi-Vapor Permeable Materials: 1-10 perms (unfaced expanded polystyrene, fiberfaced isocyanurate, heavy asphalt impregnated building papers, some latex-based paints).
  - d. Vapor Permeable Materials: 10+ perms (unpainted gypsum board and plaster, unfaced fiber glass insulation, cellulose insulation, unpainted stucco, cement sheathings, spun bonded polyolefin or some polymer-based exterior air barrier films).
- 3. Perm: Unit of measurement typically used in characterizing water vapor permeance of materials. Measures flow of water vapor through material.

## B. Reference Standards:

- 1. ASTM International:
  - a. ASTM C665-12, 'Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing' (Section 7.4, Water-Vapor).
  - b. ASTM C755-10(2015), 'Standard Practice for Selection of Water Vapor Retarders for Thermal Insulation'.
  - c. ASTM C834-17, 'Standard Specification for Latex Sealants'.
  - d. ASTM C920-14a. 'Standard Specification for Elastomeric Joint Sealants'.
  - e. ASTM C1338-14, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.
  - f. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - g. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.

#### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Manufacturer's Certificate:
      - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
      - 2) Certificate from Manufacturer indicating date of manufacture.
  - 2. Manufacturers' Instructions:
    - Manufacturer's installation recommendations for each Product.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
  - 1. Deliver and keep in original containers until ready for use.
- B. Storage and Handling Requirements:
  - 1. Handle to prevent damage to material.
  - 2. Store sealants in a cool dry location, but never under 40 deg F.
  - 3. Special care should be taken when working with open flame.

## 1.5 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Vapor retarder:
    - a. Limitations:
      - 1) For use in heating and mixed climates.
      - 2) Not suited for cooling climates with high outdoor humidities.
    - b. Installation:
      - 1) Follow Manufacturer's recommendations for installation of vapor retarder.
  - 2. Sealants:
    - a. Follow Manufacturer's temperature recommendations for installing sealants.

## 1.6 WARRANTY

- A. Manufacturer's Warranty:
  - 1. Provide Manufacturer's limited one-year warranty against Manufacturer's defects.

#### PART 2 - PRODUCTS

## 2.1 MATERIAL

- A. Sheet Retarder:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. Certainteed MemBrain, The SMART Vapor Retarder:

## 2.2 DESIGN CRITERIA

- A. Material Standard:
  - 2 mil thick polyamide film vapor retarder meeting requirements of ASTM C665 and water-vapor permeance of ASTM E96/E96M.
  - 2. Used with unfaced, vapor permeable mass insulation in wall and ceiling cavities.
- B. Physical / Chemical Properties:
  - 1. Water Vapor Permeance:
    - a. Equal to or less than 1.0 perm.as per ASTM E96/E96M desiccant method, or dry cup method and increases to greater than 10.0 perms using wet cup method as per ASTM E96/E96M.
  - 2. Fungi Resistance:
    - a. No growth as per ASTM C1338.
  - 3. Corrosivity:
    - a. No unusual aspect of corrosion such as pitting, cracking and adhesive cure inhibition as per ASTM C665).
- C. Fire Hazard Classification:
  - 1. Material surface burning characteristics shall have flame spread rating in accordance with ASTM E84:
    - a. Flame spread index 20.
    - b. Smoke-developed index 55.

## D. Air Barrier:

- 1. To be used as air barrier when installed with recommended tapes and sealants.
  - a. See CCMC Evaluation Report 13278-R (Vapour Barrier with RH-Dependent Water Vapour Permeance).

## 2.3 ACCESSORIES

## A. Lap Sealant:

- 1. Type Two Acceptable Products:
  - Tremco, Tremflex 834, siliconized acrylic latex sealant shall be used as specified caulking sealant conforming to ASTM C834 or equivalent acoustical or silicone-based sealants conforming to ASTM C920 or ASTM C834 shall be used.
  - b. Equal as approved by Manufacturer before use. See Section 01 6200.

## B. Tape:

- 1. Type Two Acceptable Products:
  - a. As approved by Manufacturer before use. See Section 01 6200.

## C. Window/Door Openings:

- Sealant:
- 2. Type Two Acceptable Products:
  - a. As approved by Manufacturer before use. See Section 01 6200.

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

#### A. General:

- 1. Do not use damaged or deteriorated materials.
- 2. Do not apply caulking at temperatures below 40 deg F.
- 3. Do not use low permeance interior finishes such as vinyl wallpaper or vapor retarding paints.
- 4. Do not use with wet spray insulation systems.
- 5. Installation:
  - a. Install in accordance with Manufacturer's written instructions.
  - b. Install in most areas, on warm-in-winter side of insulation (toward interior). For some warm and humid areas, vapor retarder should be installed towards exterior of building envelope.
  - c. Installation in wood framing: Same as polyethylene sheeting.

## B. Installation as Air Barrier System:

- 1. Roof/Attic/Ceiling Applications:
  - a. Staple to bottom of ceiling joists as recommended by Manufacturer.
  - b. Seal retarder to interior and exterior wall top plates using recommended sealants.
  - c. Fasten retarder through sealant to plates as recommended by Manufacturer.
  - d. Allow retarder to overlap at corners as recommended by Manufacturer.
- 2. Exterior Wall Applications:
  - a. Install wall application as recommended by Manufacturer.
  - Apply recommended sealant over ceiling overlapped retarder material at top plate, to frame around window and door rough openings and to bottom plate as recommended by Manufacturer to ensure an air-tight assembly.
- 3. Acoustical and Sealant Application at Sheet Terminations:
  - a. Install sealants as recommended by Manufacturer to ensure an air-tight assembly.
- 4. Lapped Joint Treatment:
  - a. Apply recommended sealant to wood stud surface.
  - b. Overlap and as recommended by Manufacturer.
  - c. Seal overlapped joint using recommended sheathing tape.
  - d. All vertical and horizontal seams should be treated as described above.
- Penetrations:
  - a. Building envelope penetrations include windows, doors, electrical outlets, gas lines, plumbing, etc:
    - 1) Cut and fit sheeting tightly around penetrations as recommended by Manufacturer.

- Seal retarder around all electrical, HVAC and plumbing penetrations with recommended sealants or sheathing tapes.
- 6. Window and Door Treatment:
  - a. Cut sheeting to fit rough opening as recommended by Manufacturer.
  - b. Apply recommended sealant between retarder and window frame.
  - Attach through sealant to window head, jambs and sill. Seal window to rough opening with recommended sealant.
  - d. Apply recommended sealant between interior finishing material and attached sheeting.
- 7. Sheet Tears and Holes:
  - a. Cover all tears and holes with recommended sheathing tape.
  - b. Treat large holes (greater than 1 inch) like large penetrations using square patch.
- 8. Electrical Outlets:
  - a. Wrap and seal electrical boxes using recommended sheathing tapes and sealants.
  - b. Airtight plastic boxes are recommended.
- 9. Plumbing Penetrations:
  - a. Secure plumbing lines to rigid mounting panel.
  - b. Seal penetrations using recommended sealants.
  - c. Attach sheeting to mounting panel using recommended sealants.
- 10. Air Barrier System Continuity:
  - a. Install as continuous interior air barrier system:
    - 1) Maintain air barrier system continuity at wall, ceiling, floor and foundation intersections. Use recommended sealants. Seal between framing and retarder overlaps.
    - 2) Coordinate installation details with framing and insulation trade contractors.

#### C. Fasteners:

- 1. Fasteners as approved by Manufacturer:
  - a. Following recommendations for type, size, spacing and installation methods.
  - b. To resist wind forces, fastened to supporting structure and supported by gypsum wallboard on one side and insulation on other.
- D. Seal penetrations through vapor retarder immediately before installation of gypsum board.

## 3.2 FIELD QUALITY CONTROL

- A. Field Inspection:
  - 1. Vapor retarder is to be air tight and free from holes, tears, and punctures.
    - a. Immediately before installation of gypsum board, inspect vapor retarder for holes, tears, and punctures and repair damaged areas.
    - b. Immediately before completion of Project, inspect exposed vapor retarder for holes, tears, and punctures and repair damaged areas.

## END OF SECTION

## SECTION 07 2616 BELOW-GRADE VAPOR RETARDER

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Vapor retarder, seam tape, and penetration accessories for installation under interior slabs-on-grade.
- B. Related Requirements:
  - 1. Section 31 1123: 'Aggregate Base' for installation of vapor retarder over aggregate base under concrete slab.

## 1.2 REFERENCE

- A. Association Publications:
  - 1. American Concrete Institute:
    - a. ACI 302.1R-04, 'Guide for Concrete Floor and Slab Construction'.
      - 1) Section 3.2.3, 'Vapor Retarder'.
    - b. ACI 302.2R-06, 'Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials'.

#### B. Definitions:

- 1. Vapor Barrier: Material that has permeance of 0.1 perm or less. Vapor barrier is a material that is essentially vapor impermeable. Vapor barrier is a Class I vapor control layer. Test procedure for classifying vapor retarders is ASTM E-96 Test Method A—the desiccant or dry cup method.
- 2. Vapor Retarder: Vapor retarder is a material that has permeance of 1.0 perm or less and greater than 0.1 perm. Vapor retarder is a material that is vapor semi-impermeable. Vapor retarder is a Class II vapor control layer. The test procedure for classifying vapor retarders is ASTM E-96 Test Method A—the desiccant or dry cup method.
- 3. Vapor Retarder Classes and Permeance Descriptions:
  - a. Classes of Vapor Retarders:
    - 1) Class I Vapor Retarder: 0.1 perm or less.
    - 2) Class II Vapor Retarder: 1.0 perm or less and greater than 0.1 perm.
    - 3) Class III Vapor Retarder: 10 perm or less and greater than 1.0 perm.
  - b. Four general classes based on permeance):
    - 1) Vapor Impermeable: 0.1 perm or less.
    - 2) Vapor semi-impermeable: 1.0 perm or less and greater than 0.1 perm.
    - 3) Vapor semi-permeable: 10 perm or less and greater than 1.0 perm.
    - 4) Vapor permeable: greater than 10 perms.

## C. Reference Standards:

- 1. ASTM International:
  - a. ASTM D1709-16a, 'Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method'
  - b. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.
  - c. ASTM E1745-11, 'Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs'.

## 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut-sheets.
  - 2. Samples:
    - a. Vapor Retarder:
      - 1) Submit sample of specified vapor retarder.

- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Independent laboratory test results showing compliance with ASTM C1745 Standard.
  - 2. Source Quality Control Submittals:
    - a. Vapor Retarder:
      - 1) Installation, seaming, and penetration boot instructions.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty:
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's documentation showing compliance to Contract Documents.

#### 1.4 WARRANTY

- A. Manufacturer Warranty:
  - Manufacturer standard warranty to be free of defects and installed without damage.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Fortifiber, Reno, NV www.fortifiber.com.
    - b. Insulation Solutions, East Peoria, IL www.insulationsolutions.com.
    - c. Inteplast Group, Livingston NJ www.BarrierBac.com.
    - d. Raven Industries, Sioux Falls, SD www.ravenind.com.
    - e. Reef Industries, Houston, TX www.reefindustries.com.
    - f. Stego Industries, San Juan Capistrano, CA www.stegoindustries.com.
    - g. W R Meadows, Hampshire, IL www.wrmeadows.com.
- B. Materials:
  - 1. Vapor Retarder:
    - a. Design Criteria:
      - 1) Meet requirements of ASTM E1745, Class A rating.
      - 2) Thickness: 15 mil minimum.
      - 3) Physical Properties:
        - a) Water Vapor Pemeance ASTM E96, Method A Perm 0.01
        - o) Puncture Resistance ASTM D1709.
      - Category Four Approved Products. See Section 01 6200 for definition of Categories.
        - 1) Barrier-Bac VB-350 (16 mil) by Inteplast Group.
        - 2) Griffolyn 15 by Reef Industries.
        - 3) Moistop Ultra 15 Underslab Vapor Retarder by Fortifiber.
        - 4) Perminator (15 mil) by W R Meadows.
        - 5) Stego Wrap by Stego.
        - 6) Vapor Block 15 by Raven Industries.
        - 7) Viper Vaporcheck II 15 mil by Insulation Solutions.

## 2.2 ACCESSORIES

- A. Vapor Barrier:
  - 1. Seam Tape: As recommended by Membrane Manufacturer for continuous taping of seams and sealing of penetration boots.
  - 2. Penetration Boots at Utility Penetrations:
    - a. Quality Standard: Factory fabricated pipeboots:

- 1) Moistop: The Boot.
- 2) Raven: VaporBoot.
- 3) Reef Industries: VaporBoot.
- 4) All Others:
  - a) Other Manufacturer's boot system.
  - b) or
  - c) Field fabricated from same material as vapor retarder membrane.

## PART 3 - EXECUTION Not Used

END OF SECTION

# SECTION 07 2719 PLASTIC SHEET AIR BARRIERS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install air infiltration barriers on exterior side of exterior wall sheathing as described in Contract Documents.

## 1.2 REFERENCES

- A. Reference Standards:
  - ASTM International:
    - a. ASTM E1677-11, 'Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls'.

## 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports: Copy of test results showing performance characteristics.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty (if available from Manufacturer).

## 1.4 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
  - 1. Manufacturer Qualifications:
    - a. Provide single source for all products of system.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's limited warranty (if available on product).

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Styrofoam Weathermate Plus by Dow, Chemical Co, Midland, MI www.dow.com
    - b. Tyvek HomeWrap by Du Pont Company, Wilmington, DE www.dupont.com
    - c. DriShield Housewrap by Protecto Wrap, Denver, CO www.protectowrap.com
    - d. Fortress Pro by Raven Industries, Sioux Falls, SD www.ravenind.com
    - e. Typar Housewrap by Fiberweb, Old Hickory, TN www.typar.com.

## B. Materials:

- 1. Air Retarder:
  - a. Non-woven.
  - b. Meet requirements of ASTM E1677, Type I.
- Sealing Tape:
  - a. Type Two Acceptable Products:
    - 1) DuPont Contractor Tape.
    - 2) Fortress Pro Seaming Tape.
    - 3) Typar Construction Tape.
    - 4) 3M Contractor Sheathing Tape.
    - 5) Protecto Wrap BT25 XL Window Sealing Tape.
    - 6) As recommended in writing by Air Retarder Manufacturer.
- 3. Fasteners:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Wood Framing: Corrosion resistant roofing nails with 3/4 inch long shank minimum and one inch diameter plastic head or Tyvek Wrap Caps. Staples are only allowed to aid in installation with permanent fasteners installed immediately thereafter.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install over exterior wall sheathing.
  - 1. Apply specified fasteners along stud lines at 18 inches maximum on center. Lap horizontal joints 6 inches minimum, with upper layer placed over lower layer. Lap vertical seams 16 or 24 inches as necessary to match framing spacing. Do not fasten at bottom where necessary to allow for installation of flashing behind air infiltration barrier at base of masonry veneer.
  - 2. Seal joints and penetrations through air infiltration barrier with specified tape before installation of finish material. Air infiltration barrier shall be air tight and free from holes, tears, and punctures.

END OF SECTION

## SECTION 07 3113 ASPHALT SHINGLES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install Asphalt Shingle Roofing System as described in Contract Documents.
- B. Related Requirements:
  - Section 06 2001: 'Common Finish Carpentry Requirements' for installation of wood nailers, curbs and blocking for Steeple if required.
  - 2. Division 22: Plumbing vent piping.
  - 3. Division 23: HVAC flues and air piping.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Miscellaneous flashing and sheet metal:
    - a. Drip metal.
    - b. Valley flashing.
    - c. Wall flashings.
  - 2. Pipe and flue roof jacks.
  - 3. Ridge vent.

## D. Related Requirements:

- 1. Section 07 6310: 'Steep Slope Roof Flashing: Asphalt Tile' for furnishing of roof flashing, pipe jacks, drip edge and miscellaneous flashing and sheet metal.
- 2. Section 07 7226: 'Ridge Vent.

## 1.2 REFERENCES

## A. Definitions:

- 1. Flame Spread Classification: Categories as per ASTM E84/UL 723 or CAN/ULC-S102:
  - a. Class A: Highest fire-resistance rating for roofing as per ASTM E108. Indicated roofing is able to withstand severe exposure to fire exposure to fire originating from sources outside building.
  - b. Class B: Fire-resistance rating indicating roofing materials are able to withstand moderate exposure to fire originating from sources outside of building.
  - Class C: Fire-resistance rating indicating roofing materials are able to withstand light exposure to fire
    originating from sources outside of building.
- 2. Wind Uplift: Wind-induced forces on roof system or components in roof system. Wind uplift generally includes negative pressure component caused by wind being deflected around and across surfaces of building and positive pressure component from air flow beneath roof deck.

## B. Reference Standards:

- 1. ASTM International:
  - a. ASTM D226-09/D226M-17, 'Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing'.
  - b. ASTM D1970/D1970M-17, 'Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection'.
  - c. ASTM D3018/D3018M-11, 'Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules'.
  - d. ASTM D3019/D3019M-17, 'Standard, 'Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered'.
  - e. ASTM D3161/D3161M-16a, 'Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)'.
  - f. ASTM D3462/D3462M-16, 'Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules'.

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- g. ASTM D4869/D4869M-16a, 'Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing'.
- h. ASTM D7158/D7158M-17, 'Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)'.
- i. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
- j. ASTM E108-17, 'Standard Test Methods for Fire Tests of Roof Coverings'.
- . ASTM F1667-17, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples'.
- 2. International Building Code (IBC) (2015 Edition or latest edition adopted by AHJ):
  - a. Chapter 15, 'Roof Assemblies And Rooftop Structures'.
- 3. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2015 Edition).
- 4. Underwriters Laboratories (UL):
  - a. UL 580: 'Tests for Uplift Resistance of Roof Assemblies' (5th Edition).
  - b. UL 723, 'Tests for Safety Test for Surface Burning Characteristics of Building Materials' (10th Edition).
  - c. UL 790, 'Standard Test Methods for Fire Tests of Roof Coverings' (8th Edition).
  - d. UL 2218, 'Standard for Impact Resistance of Prepared Roof Covering Materials' (2nd Edition).

## 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Pre-Installation Conference:

- 1. Participate in MANDATORY pre-installation conference:
  - a. Roofing Installer's Foreman and those responsible for installation of roofing to be in attendance. Include Shingle Manufacturer's Representative if available.
- 2. Schedule pre-installation conference at project site after completion of the installation of roof sheathing but before installation of any roofing system component.
- 3. In addition to agenda items specified in Section 01 3100, review following:
  - a. Review if Project is in high wind area.
  - b. Review if Project could have ice dam problems.
  - c. Review Shingle Manufacturer's ventilation requirements.
  - d. Review Shingle Manufacturer's Ambient Conditions requirements.
  - e. Review existing roof conditions including moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
  - f. Review proper valley, flashing, penetrations, secondary underlayment, sealants, and nailing requirements.
  - g. Review racking installation method is not permitted.
  - h. Review steeple base secondary underlayment installation under Steeple.
  - i. Review Ladder Anchor requirements for roof bracket attached to roof to provide safety for access on to roof.
  - j. Review Cleaning and Disposal requirements.
  - k. Review Special Procedure Submittal for Warranty Information to be given to Manufacturer before Manufacture will issue Roof Warranty by Installer.
  - I. Review safety issues.

#### B. Sequencing:

- 1. Sequence of Roofing Materials (see valley flashing detail in Contract Drawings):
  - a. Apply continuous 12 inches wide strip at edge of eaves and rakes of secondary underlayment.
  - b. Metal drip edge.
  - c. Secondary underlayment.
  - d. Apply three (3) continuous 36 inch wide sheets of secondary underlayment in valley.
  - e. Install one (1) continuous 36 inch wide strip of primary underlayment atop secondary underlayment and centered over valley.
  - f. Install formed valley metal over strip of primary underlayment.
  - g. Apply 12 inches wide strips of secondary underlayment lapping nailed edge of formed valley metal 3 inches.
  - h. Primary underlayment.
  - i. Asphalt shingles.
  - j. Counter flashings over step flashing.
- 2. Coordinate sequencing of products furnished in Section 07 7226: 'Ridge Vents'.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - L. Product Data:

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- a. Color and style selection.
- 2. Samples:
  - a. Full size shingle.
- B. Informational Submittals:
  - Certificates:
    - a. Installers:
      - 1) Provide current Certification for completion of certified training from Shingle Manufacturer.
      - Installer's signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.
  - 2. Tests And Evaluation Reports:
    - a. Manufacturer's test reports.
    - b. Wind speed coverage for warranted wind speed.
  - 3. Manufacturers' Instructions:
    - a. Shingle Manufacturer's installation instructions and details for installation of secondary underlayment at penetrations, dormers, eaves, rakes, etc, to fit environmental conditions at Project.
  - 4. Special Procedure Submittals:
    - a. Contact Owner's Representative (FM Group or Project Manager) for following information:
      - 1) Installer to include following mandatory information to be added to 'Roofing Manufacturer System Warranty' submitted with Closing Documents.

a)	Name of Owner (name of FM Group)
b)	Mailing Address (FM office address)
c)	Building Property ID (unique 7 digit identifier)
d)	Project site address:
e)	Roof Completion Date
f)	Any addition data required from Manufacturer.

- Installer to include following mandatory information to be added to 'Roof Installer Workmanship Warranty' submitted with Closing Documents:
  - a) Name of Owner (name of FM Group)
    b) Mailing Address (FM office address)
    c) Building Property ID (unique 7 digit identifier)
    d) Project site address:
  - e) Roof Completion Date
  - f) Any addition data required from Manufacturer.
- 5. Qualification Statement:
  - a. Installer:
    - 1) Asphalt Shingles:
      - a) Provide Qualification documentation.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Asphalt Shingles:
        - a) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
        - Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
      - 2) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature.
        - b) Color selections.
        - c) Test and evaluation reports.
      - 2) Roofing Inspection Documentation:
        - a) Include copy of roof inspection report.
      - 3) Certificate: Installer statement of compliance for performance requirements.
      - 4) Certificate: Installer completion of certified training.
      - 5) Test And Evaluation Report: UL fire-resistance rating test report.
      - 6) Test And Evaluation Report: NFPA 101 Class A approval.
      - 7) Test And Evaluation Report: Wind resistance requirements required.

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- D. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Provide one (1) square minimum of bundled shingles.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Building Codes:
    - a. Meet requirements for NFPA 101 Class A roof assembly.
    - b. Roof system will meet requirements of all federal, state, and local codes having jurisdiction.
  - 2. Fall Protection: Meet requirement of fall protection as required by federal, state, and local codes having jurisdiction.
  - 3. Fire Characteristics:
    - a. Provide shingles and related roofing materials with fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency:
      - Exterior Fire-Test Exposure: Class A; UL 790, CAN/ULC-S102, or ASTM E108, for application and roof slopes indicated.
        - a) Materials shall be identified with appropriate markings of applicable testing agency.
  - 4. Wind Resistance:
    - a. Meet ASTM D3161/D3161M for wind resistance.
      - 1) Installation shall comply with IBC Table 1507.2.7, 'Attachment'.
  - 5. Wind Speed:
    - a. As required to meet local codes having jurisdiction.
  - 6. Wind Uplift Resistance:
    - a. Meet UL 580 wind uplift of roof assemblies.
    - b. Meet UL 1897 uplift test for roof covering systems.
    - c. Meet ASTM D7158/D7158M for wind resistance for uplift force/uplift resistance.

## B. Qualifications:

- 1. Manufacturer:
  - a. Asphalt Shingles:
    - Asphalt shingles are required to be produced under quality control program administered by inspection agency currently accredited by ICBO ES or recognized by National Evaluation Service, Inc. Quality control manual developed in consultation with approved agency and complying with ICBO ES Acceptance Criteria for Quality Control Manuals (AC10), must be submitted.
  - b. Underlayment:
    - Underlayment is required to be manufactured under approved quality control program with inspections by inspection agency accredited by International Accreditation Service (IAS) or otherwise acceptable to ICC-ES.
    - Quality documentation complying with ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted for roof underlayment.
- 2. Roof Installer Foreman Qualifications:
  - a. Requirements of Section 01 4301 applies but not limited to the following:
    - 1) Provide documentation if requested by Architect.
      - a) Approved and authorized by Roofing Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's warranty before bid.
      - b) Completed Shingle Manufacturer's certified trained.
      - c) Have thorough knowledge of installing asphalt shingle roofing and have minimum of five (5) years roofing experience.
      - d) Current license for the city, county, and state where project is located and license for specific type of roofing work to be performed.
      - Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
      - Flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.
- Roof Installer:
  - a. Provide 'Roof Installer Workmanship Warranty' as specified in Warranty in Part 1 of this specification.

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## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Make no deliveries to job site until installation is about to commence, or until approved storage area is provided.
  - Deliver products job site in Manufacturer's original unopened containers or wrappings with labels intact and legible bearing all seals and approvals.
  - 3. Deliver materials in sufficient quantities to allow continuity of work.
  - 4. Remove any material not approved from job site.

## B. Storage And Handling Requirements:

- Storage Requirements:
  - a. Follow Manufacturer's instructions and precautions for storage and protection of materials.
  - Protect roof materials from physical damage, moisture, soiling, and other sources in a clean, dry, protected location.
  - c. Stacking:
    - 1) Shingles: Bundles should be stacked flat.
    - 2) Underlayment:
      - a) Do not double-stack pallets.
      - b) Stack rolls upright until installation.
  - d. Temperature:
    - 1) Shingles:
      - a) Store in covered ventilated area at maximum temperature of 110 deg F.
      - b) Use extra care in handling shingles when temperature is below 40 deg F.
      - Underlayment: Store in area with temperature between 40 deg F and 100 deg F.
  - e. Unacceptable Material:
    - Remove from job site materials that are determined to be damaged by Architect or by Roofing Manufacturer and replace at no additional cost to Owner.
- 2. Handling Requirements:
  - a. Handle rolled goods to prevent damage to edge or ends.
- 3. Roof Top Loading:

2)

- a. Lav shingle bundles flat.
- b. Do not bend over ridge.

## 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. General:
    - a. Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.
  - 2. Shingles:
    - a. Do not install shingles at lower temperatures than allowed by Shingle Manufacturer for application.
  - 3. Underlayment
    - a. Install self-adhering sheet underlayment within range of ambient and substrate temperatures recommended by manufacturer.

## 1.8 WARRANTY

- A. Special Warranty:
  - 1. Shingle Manufacturer's special forty (40) year minimum labor and material warranty written for VMR program, including but not limited to:
    - a. CertainTeed:
      - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
    - b. GAF:
      - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.

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- c. Owens Corning:
  - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
- 2. Standard Wind Areas:
  - a. Roofing system will resist blow-offs in winds up to 110 mph for ten (10) years when installed as specified below.
  - b. Meet requirements of ASTM D3161/D3161M UL Class D.
- 3. Roof Installer Workmanship Warranty:
  - Provide ten (10) year workmanship warranty on roofing system and related components, including flashings, and responsible for all repairs to roofing system and related components due to roof installer's own negligence or faulty workmanship:
    - In the event that, during ten (10) year period following installation, Roof Installer defaults or fails to fulfill its obligation in relation to workmanship warranty as specified in Manufacturer's Agreement, Manufacturer will assume that obligation for remainder of ten (10) year period following original installation and Owner shall have no obligation to make or pay for repairs to or materials for roofing system that are necessary due to Roof Installer's negligence or faulty installation during that period.
- 4. Steeple:
  - a. Square Tube Pipe Boot:
    - Manufacturer's twenty (20) year warranty covering material.

## PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. CertainTeed Roofing Products, Valley Forge, PA www.certainteed.com.
      - 1) Contact Information: Wendy Fox, (800) 404-9880 wfox@dataworksintl.com.
    - b. GAF Materials Corp., Wayne, NJ www.gaf.com.
      - 1) Contact Information: John Arellano (office) (210) 896-1041 (fax) (210) 259-8050.
    - c. Owens Corning, Toledo, OH www.ownscorning.com.
      - Duration Premium shingles are available in all areas of the USA and Canada including all Duration Premium colors under LDS Church contract. Request shingles through local distribution. Any distribution questions, contact Area Sales Manager.
      - 2) For all other questions, Contact: Sam Baroudi (419) 248-7754 sam.baroudi@owenscorning.com. or Robert Hill (801) 553-2417 Robert.Hill@owenscorning.com.

## B. Components:

- 1. Shingles And Underlayment:
  - a. Fiberglass mat shingles meeting or exceeding requirements of:
    - 1) UL Class A Fire Resistance.
    - 2) ASTM D3018/D3018M, Type I (self sealing).
    - 3) Standard Wind Areas: ASTM D3161/D3161M UL Class D.
    - 4) ASTM E108 Class A.
    - 5) CSA A123.1/A123.5 (Canada).
    - 6) ASTM D3462/D3462M where required by local codes.
    - Secondary Underlayment: Meet requirements of ASTM D1970/D1970M and UL 790 Class A Fire Resistance.
    - 8) Primary (Synthetic) Underlayment: Meet requirements of ASTM D226/D226M and ASTM D4869/D4869M (physical properties only) or ASTM D1970/D1970M and ASTM E108 Class A Fire.
    - 9) Color as selected by Architect from Shingle Manufacturer's full color line.
  - b. Category One VMR Products And Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) CertainTeed:

c)

- a) Shingles:
  - (1) Standard Wind: Landmark Premium.
  - (2) Hip And Ridge Shingles: Shadow Ridge or Laminate Accessory for shingle used.
  - Primary Underlayment Under Shingles:
    - (1) Synthetic Underlayment: Diamond Deck.
  - Secondary Underlayment Under Shingles:
  - (1) WinterGuard Granular.

or

(2) WinterGuard Sand.

or

- (3) WinterGuard High Tack/High Temperature.
- Secondary Underlayment Under Shingles over Unheated Buildings:
  - Not required over unheated buildings such as Storage Shed and Stake Pavilions.
- 2) GAF:

d)

- a) Shingles:
  - (1) Standard Wind: Timberline Ultra HD.
  - (2) Hip And Ridge Shingles: TimberTex or Ridglass.
- b) Primary Underlayment Under Shingles:
  - (1) Synthetic Underlayment: Tiger Paw.
- c) Secondary Underlayment Under Shingles:
  - (1) Weatherwatch.

or

- (2) StormGuard.
- d) Secondary Underlayment Under Shingles over Unheated Buildings:
  - 1) Not required over unheated buildings such as Storage Shed and Stake Pavilions.
- 3) Owens Corning:
  - a) Note:
    - (1) Duration Premium shingles are available in all areas of the USA and Canada including all Duration Premium colors under LDS Church contract. Request shingles through local distribution.
    - (2) Any questions, contact Manufactures Area Sales Manager.
  - b) Shingles:
    - (1) Standard Wind: Duration Premium shingles.
    - (2) Hip And Ridge Shingles: DecoRidge Hip & Ridge.
  - c) Primary Underlayment Under Shingles:
    - (1) Synthetic Underlayment: Deck Defense High Performance Roof Underlayment.
  - d) Secondary Underlayment Under Shingles:
    - (1) Weatherlock G Granulated Self-Sealing Ice & Water Barrier.

Or

- (2) Weatherlock Specialty Tile & Metal for High Temperature. or
- (3) Weatherlock Cold Climate for cold weather adhesion and flexibility.
- e) Secondary Underlayment Under Shingles over Unheated Buildings:
  - (1) Not required over unheated buildings such as Storage Shed and Stake Pavilions.

## 2.2 ACCESSORIES

- A. Elastomeric Roofing Sealant:
  - 1. Design Criteria:
    - a. Meet requirements of ASTM D3019/D3019M.
    - b. Non-asphalt roofing cement (not permitted).
    - c. Elastomeric.
    - d. Cold temperature pliability.
    - e. Compatible with roof penetration boots.
  - 2. Category Four Products And Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Flintbond SBS Modified Bitumen Caulk by CertainTeed.
- B. Fasteners:
  - 1. Primary Underlayment:
    - a. Corrosion resistant roofing nails with one inch diameter head and 3/4 inch long shank minimum.
      - 1) If shingles applied as underlayment is laid, use metal or plastic head Simplex roofing nails.
      - 2) If shingles not applied as underlayment is laid, use plastic head only.
    - b. Staples not permitted.
  - 2. Shingles:
    - a. Design Criteria:
      - 1) Meet following requirements for nails:
        - a) Comply with ASTM F1667, Type I, Style 20-Roofing Nails.
        - b) Eleven gauge galvanized steel or equivalent corrosion-resistant roofing nail.
        - c) Nail head sizes: 3/8 inch nominal diameter.

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- Sufficient length to penetrate through roof sheathing 1/4 inch or 3/4 inch minimum into solid wood decking.
- e) Hot-dipped galvanized or electroplated fasteners comply with requirements of ASTM A153, Class D
- f) Stainless-steel fasteners meet requirements of Type 304 (UNS S30400) or Type 316 (UNS S31600).

#### b. General:

- Hot-dipped galvanized, electroplated non-corrosive gun-driver nails, or stainless-steel fasteners may be used.
- Fasteners within 15 miles of coastal areas (oceanside) applications must use hot-dipped galvanized or stainless steel.
- 3) All exposed fasteners (including ridge shingles) must use hot-dipped galvanized or stainless steel.
- 4) Staples not permitted:
  - a) Architect/Roof Consultant may approve in writing, staple gun that installs exposed fasteners with staples.

#### C. Ladder Anchor:

- Description:
  - a. Roof Bracket attached to roof allowing removable ladder to meet ANSI and OSHA guidelines to provide safety for access on to roof.
- 2. Design Criteria:
  - a. Anchor to meet requirements for strength and permanent deformation at working load and working load with applied safety factor. No fracture of detachment is allowed at ultimate load of 1,100 pounds.
  - b. Adapts to any roof pitch.
- 3. Components:
  - a. Roof Plate and Fascia Mount.
    - 1) Dimensions: 22 inches13-1/2 inches.
    - 2) Weight Capacity: 375 lbs.
    - 3) Accessory Weight: 13 lb.
  - b. Thirteen (13) strong-drive timber screws.
  - c. One (1) Eternabond double stick putty tape.
- 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - LedgeLock Mounting Bracket Model 57566 by Little Giant Ladder Systems, Springville, UT www.littlegiantladders.com.
    - 1) To order, call (888) 320-2488.

## D. Steeple:

- 1. Square Tube Pipe Boot:
  - a. Description:
    - 1) Square retrofit.
    - 2) Temperature range: -65 deg F to +270 deg F.
  - b. Type:
    - 1) Weather resistant.
    - 2) Roof adaptability.
    - 3) EPDM (Ethylene Propylene Diene Monomer).
    - 4) Color: Black.
    - 5) Sealing unit to roof shall be done in accordance with Pipe Boot Manufacturer's recommendations.
  - c. Type Two Acceptable Products:
    - 1) Master Flash by Aztec Washer Company, Inc., Poway, CA www.aztecwasher.com.
      - Model RF101BP-SQ.
    - 2) Large Retrofit Flashing by Portals Plus, Bensenville, IL www.portalsplus.com.
      - a) Model 11025 with 4 inches square Adapter.
      - b) Provide necessary adapter rings including angle iron and square tube adapters.
      - c) Hardware shall be stainless steel.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

## 3.1 INSTALLERS

A. VMR Manufacture's Approved Roofing Installers: See Section 01 4301.

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## 1. Utah Area:

- a. Approved Installers:
  - 1) CertainTeed:
    - a) American Roofing Co. (AMCO), Salt Lake City, UT Contact: Keith J Yorgason (801) 269-1276.
    - b) Far West Roofing, Bluffdale, UT Contact Douglas Cooper (801) 253-7799.
    - c) Heritage Roofing, Bluffdale, UT Contact: Russ or Jim (801) 576-8447.
    - d) Island Heights Construction Inc., Logan, UT Contact: Alan Ringer (435) 753-7403.
    - e) JTS Roofing Inc., Ogden, UT Contact: Todd Shupe (801) 627-6450.
    - f) Kendrick Bros Roofing Inc., Ogden, UT Contact: Greg Kendricki (801) 430-6060.
    - g) Mountain Peak Builders, Inc., Logan, UT Contact: Zane Rust (435) 232-1367.
    - h) North Face Roofing, Inc., Park City, UT Craig Peters (801) 455-8492.
    - i) Perkes Roofing, Ogden, UT Contact: Jon Bertagnolli (801) 430-4489.
    - j) Redd Roofing Co., Ogden, UT Lance Redd (801) 621-1363.
    - k) Skyline Roofing, Inc. Adam Stout, LaVerkin, UT (435) 635-3172.
    - 1) Stout Roofing Inc., St George, UT Contact: Kelly Casey (435) 635-4288.
    - m) Stuart Roofing, Ogden, UT, Forest Stuart (801) 394 1923.
    - n) VIP Roofing, Centerville, UT Contact: Max Ker (801) 631-6182.
    - o) Warburton's Inc., Pleasant Grove, UT Contact: Greg Warburton (801) 785-9500.
    - p) White Roofing Co., Nephi, UT Contact: Shannon White (435) 623-0241.
  - 2) GAF:
    - a) American Roofing Co. (AMCO), Salt Lake City, UT Contact: Keith Yorgason (801 269-1276.
    - b) Aspen Roofing, Salt Lake City, UT Contact: Jon Brady (801) 483-1660.
    - c) Capital Roofing Service, Inc., Sandy, UT Contact: Paul Hitzman (801) 562-5568.
    - d) Fortress Roofing, Murray, UT Contact: Adam Cordon (801) 509-8625.
    - e) Knockout Roofing, Riverton, UT Contact Jared Gran (801) 604-4090.
    - f) Lifetime Roofing, West Point, UT Parker Cornably (801) 200-7426.
    - g) Parrish Construction, American Fork, UT Contact: Tyler Parrish (801) 787-3633.
    - h) RSW Plus, Nephi, UT Contact: Rick White (435) 623-1719.
    - i) Skyline Roofing Inc., La Verkin, UT Contact: Adam Stout (435) 635-3172.
    - j) Wesley Green Roofing, UT Contact: Scott Horsepool (801) 486-3411.
  - 3) Owens-Corning:
    - a) American Roofing Co. (AMCO), Salt Lake City, UT Contact: Keith J Yorgason (801) 269-1276.

## 3.2 EXAMINATION

- A. Verification Of Conditions:
  - Examine deck to determine if it is satisfactory for installation of roofing system. Conditions include, but are not limited to, moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
    - a. Report unsatisfactory conditions in writing to Architect.
    - b. Commencement of Work by installer is considered acceptance of substrate.

## 3.3 PREPARATION

- A. Surface Preparation:
  - 1. Clean roof deck:
    - Remove dirt, protruding nails, shingle nails, and debris, before installation of underlayment.
  - Roof deck must be dry to help prevent buckling of deck, which can result in deck movement and damage to primary underlayment.
  - 3. Following Manufacturer's recommendations for placing materials on roof.
    - a. Prevent material from sliding off roof.

## 3.4 INSTALLATION

- A. Sequence of Roofing Materials as shown and noted on Contract Drawings:
  - 1. 12 inch strip Secondary Underlayment at Eave.
  - 2. Metal Drip Edge.
  - 3. General Secondary Underlayment.

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- 4. Valley Secondary Underlayment (8' 6" wide strip of Secondary Underlayment (3 strips) in Valleys applied over sheathing).
- 5. Valley Secondary Underlayment (36 inch wide Primary Underlayment under Valley Metal).
- 6. Valley Metal (24 inchwide valley metal 10 ft lengths).
- 7. 12 inch strip of Secondary Underlayment over nailed edges (of Valley Metal).
- 8. General Primary Underlayment.
- 9. Asphalt Shingles, Step Flashings.
- 10. Counter Flashing.

## B. Underlayment:

- General:
  - a. Temporary Roof:
    - 1) Do not use permanent underlayment installation as temporary roof.
    - 2) If temporary roof is used, remove completely before installation of permanent underlayment.
  - b. Follow Shingle Manufacturer's recommendations for installation of primary and secondary underlayment, particularly at eaves, rakes, and penetrations, unless specified installation procedures and Contract Drawing details are more stringent.
  - c. Avoid scuffing underlayment that can compromise surface and cause leaking. If scuffing occurs, following Manufacturer's recommendation for repair.
  - d. Staples are not permitted.
  - e. Weather conditions:
    - Do not leave underlayment exposed to weather more than thirty (30) days after beginning of underlayment installation even if Manufacture allows longer period of time.
    - 2) If underlayment is exposed for more than thirty (30) days after beginning of underlayment installation, treat as temporary roof under first paragraph above.
    - 3) If moisture is deposited on exposed underlayment, obtain written approval from Shingle Manufacturer's Representative before installing shingles.
  - f. Install valley secondary underlayment, valley primary underlayment, and valley metal after installation of general secondary underlayment, but before installation of general primary underlayment.
- 2. Primary Underlayment:
  - a. Apply 48 inch wide courses over complete deck, including areas covered with secondary underlayment unless specified otherwise.
    - 1) Overlap underlayment before fastening.
    - 2) Maintain end laps of 6 inch and side laps of 3 inch.
    - 3) Stop primary underlayment between 3 and 6 inches of inside edge of strip of secondary underlayment installed over edge of formed valley metal.
  - b. Nailing Synthetic Underlayment:
    - 1) Use low-profile plastic or steel cap corrosion resistant nails with 1 inch diameter heads to fasten underlayment in place. (Fastening underlayment without caps is not permitted).
    - 2) Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
    - 3) Fasteners should be long enough to penetrate at least 3/4 inch into roof sheathing. Fasteners must be lie flush to roof deck at 90 degree angle to roof deck and tight with underlayment.
    - 4) Do not nail through metal flashing, except drip edge, when installing primary underlayment.
    - 5) Follow Shingle Manufacturer's installation instructions for following:
      - a) Securing underlayment to roof deck adjusting for roof slope nailing requirements.
      - b) Side lap, end lap, and overlapping nailing requirements.
      - c) Rake and eave nailing requirements.
      - d) High wind condition nailing requirements.
      - e) Sealants recommendations.
- 3. Secondary Underlayment:
  - a. Under Shingles:
    - 1) Lap end joints 6 inches and side joints 3 inch minimum.
    - 2) Apply continuous 12 inches wide strip at edge of eaves and rakes before installing drip edge.
    - 3) Apply six (6) 36 inch wide courses along eaves and two (2) courses at rakes as described in Contract Documents with first course overlapping drip edge and 12 inches wide previously applied strip.
  - b. Steeple Base:
    - Secondary Underlayment installed as shown on Contract Drawings under Steeple.
- 4. Valley Underlayment:
  - a. Apply three (3) continuous 36 inch wide sheets of secondary underlayment in valley lapped to provide 102 inch wide covered area centered over valley.
  - b. Apply one (1) continuous 36 inch wide strip of primary underlayment atop secondary underlayment and centered over valley.

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- c. Install formed valley metal over strip of primary underlayment.
  - 1) Nail top of each section and lap 8 inches in direction of flow.
  - 2) Seal laps with continuous bead of elastomeric roofing sealant.
  - 3) Secure edges of valley metal with fasteners spaced at 12 inches maximum on center and approximately 1/2 inch in from edge of metal.
- d. Install 12 inches wide strips of secondary underlayment lapping nailed edge of formed valley metal 3 inches.

## C. Shingles:

- 1. Before installing shingles, inspect underlayment and metal installation with Architect and Owner. Correct improperly installed and damaged material before beginning shingle installation.
- 2. Racking installation method is not permitted by Owner and will be considered non-conforming work.
- 3. Starter shingles:
  - a. Manufacturer's starter shingles are required for Shingle Warranty.
  - b. Install shingles at eve and rakes in accordance with Shingle Manufacturer's instructions.
  - c. Cut shingles in accordance with Shingle Manufacturer's instructions or use approved starter course.
  - d. Nail to eave granule side up in continuous mastic bed with cut edge down-slope and edge overhanging eave 3/8 inch so sealing tabs are at edge of eave.
  - e. Install shingles with maximum exposure recommended by Shingle Manufacturer.
  - f. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip are offset 4 inches minimum from joints in first course.
- 4. Lay shingles so end joints are offset in accordance with Shingle Manufacturer's installation procedures.
- 5. Insure alignment by snapping chalk line at least each fifth course to control horizontal and vertical alignment.
- 6. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.
- 7. Hip and ridge shingles:
  - a. Manufacturer's hip and ridge shingles are required for Shingle Warranty.
  - b. Install specified hip and ridge shingles in accordance with Shingle Manufacturer's instructions.
  - c. Run ridge shingles as directed by Architect.
- 8. Nailing:
  - a. General:
    - 1) Six (6) Nail Pattern as recommended by Shingle Manufacturer for Shingle Warranty in each shingle.
    - 2) Place in relation to top edge of shingle as required by Shingle Manufacturer.
    - 3) Place nails one inch from each end of shingle and remainder evenly spaced between.
    - 4) Should any nail fail to penetrate sheathing by 1/4 inch minimum, drive additional nail nearby.
  - b. Nailing guns:
    - 1) Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
    - 2) Adjust nail gun pressure for nailing flush and tight to deck without cutting shingle surface.
    - 3) Drive nails perpendicular to shingle surface so nail head is flat against shingle.
    - 4) Should any nail fail to penetrate sheathing by 1/4 inch minimum, drive additional nail nearby.
- 9. Hand-Sealing:
  - a. If ambient temperature or exposure to sun will not be sufficient to secure adhesive strip to under-lying shingle within one week, hand seal shingles with elastomeric roofing sealant.
- 10. Over valley metal:
  - a. Do not drive nails through valley metal.
  - b. Run chalk line so valley metal will be exposed 6 inches wide at top and diverge 3/32 inch per ft down to eaves.
  - c. Neatly trim shingles to this line.
  - d. Seal trimmed shingle edges to valley metal with continuous bead of elastomeric roofing sealant applied within one inch of shingle edge.
- 11. Vent pipe sleeve flange:
  - a. Vent pipe sleeve flange as specified in Section 07 6310.
  - b. Fit shingles under lower edge and over sides and upper edge.
  - c. Set vent pipe flange in elastomeric roofing sealant.
  - d. Embed shingles in elastomeric roofing sealant where they overlap flange.
  - e. Apply bead of elastomeric roofing sealant at junction of vent pipe and vent flashing.
- 12. Furnished and installed in Section 07 7226 'Ridge Vents'.

## D. Steeple:

- 1. Install products following below Steeple as shown on Contract Drawings:
  - a. Square tube pipe boot.
  - b. Secondary underlayment.

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- E. Ladder Anchor:
  - 1. Follow Manufacturer's written instructions including but not limited to:
    - a. New Projects:
      - 1) Ladder anchor to be located as shown on Roof Plan.
      - 2) Verify wood blocking is correctly installed as shown on Construction Drawings.
      - 3) Attach Roof Plate to Fascia Mount.
      - 4) Attach Roof Plate on top of secondary underlayment (ice and water) with timber screws.
      - 5) Attach Fascia Mount to metal fascia system with timber screws.
      - Apply additional layer on secondary underlayment on top of Roof Plate before applying roofing material.

#### 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.
  - 2. Raking installation method is not permitted by Owner and will be considered to be not complying with Contract Document requirements and must be corrected at no additional cost to Owner.

## 3.6 CLEANING

- A. General:
  - 1. All tools and unused materials must be collected at end of each workday and stored properly off finished roof surface and protected from exposure to elements.
  - 2. Leave metals clean and free of defects, stains, and damaged finish.
    - a. Replace fascia metal that is scratched through finish to base metal.
  - 3. Properly clean finished roof surface after completion.
  - 4. Verify drains and gutters are not clogged.
  - 5. Clean shingles and building of soiling caused by this installation.
  - 6. Clean and restore all damaged surfaces to their original condition.
- B. Waste Management:
  - 1. Disposal:
    - a. All work areas are to be kept clean, clear and free of debris always.
    - b. Do not allow trash, waste, or debris to collect on roof. These items shall be removed from roof daily.
    - c. Remove debris resulting from work of this Section from roof and site. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

## 3.7 PROTECTION

A. Do not permit traffic over finished roof surface.

END OF SECTION

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# SECTION 07 6210 GALVANIZED STEEL FLASHING AND TRIM

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install miscellaneous flashing, counterflashing, and hold-down clips as described in Contract Documents and not specified to be of other material.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Miscellaneous sheet metal specialties not specified to be of other materials.
- C. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wood base.
  - 2. Sections under 07 3000 heading: 'Steep Slope Roofing' for installation of miscellaneous roofing related flashing.
  - 3. Section 07 9213: 'Elastomeric Joint Sealant'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
  - 2. Federal Specifications:
    - a. TT-S-00230C(2) Sealing Compound, Elastomeric Type, Single Component, (For Caulking, Sealing, and Glazing in Buildings and Other Structures).

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Manufacturers:
  - 1. Type Two Acceptable Manufacturers Of Metal:
    - a. CMG Coated Metals Group, Denver, CO www.cmgmetals.com.
    - b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
    - c. Fabral, Lancaster, PA www.fabral.com.
    - d. Firestone Metal Producdts, Anoka, MN www.unaclad.com.
    - e. MBCI, Houston, TX www.mbci.com.
    - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
    - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
    - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
    - i. Ryerson, Chicago, IL www.ryerson.com.
    - j. Equal as approved by Architect before installation. See Section 01 6200.

#### B. Materials:

- 1 Sheet Metal
  - Galvanized iron or steel meeting requirements of ASTM A653/A653M, G 90 or Galvalume steel meeting requirements of ASTM A792/A792M AZ50, 50 ksi.
    - 1) 22 ga for hold-down clips.
    - 2) 24 ga for all other.

## C. Fabrication:

- 1. Form accurately to details.
- 2. Profiles, bends, and intersections shall be even and true to line.
- 3. Fold exposed edges 1/2 inch to provide stiffness.

#### D. Finish:

- 1. Exposed to view:
  - a. Provide face coating of polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
  - b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
- 2. Color as selected by Architect from Manufacturer's standard colors.

## 2.2 ACCESSORIES

- A. Sealants: Rubber base type conforming to Fed Spec TT-S-00230C.
- B. Fasteners:
  - 1. Of strength and type consistent with function.
  - 2. Nails: Hot-dipped galvanized.
  - 3. Screws, Bolts, And Accessory Fasteners: Galvanized or other acceptable corrosion resistant treatment.
- C. Roof Diverter:
  - 1. Roof Diverter (Kickout Diverter) required when vertical wall extends beyond lower roof.
    - a. 24 ga galvanized iron or steel meeting requirements for sheet metal specified in materials above.
    - b. Size: 6 inch x 6 inch by 12 inches length.
- D. Step Flashing:
  - 1. Step flashing required for steep slope for roof to wall flashing.
    - a. 24 ga galvanized iron or steel meeting requirements for sheet metal specified in materials above.
    - b. Size: 5 inch x 5 inch by 8 inch or 12 inches length.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install with small, watertight seams.
- B. Slope to provide positive drainage.
- C. Provide sufficient hold down clips to insure true alignment and security against wind.
- D. Provide 4 inch minimum overlap.
- E. Allow sufficient tolerance for expansion and contraction.
- F. Insulate work to prevent electrolytic action.
- G. Roof Diverter (Kickout Diverter):
  - 1. Extend roof diverter 1 inch minimum beyond face edge of lower roof.
  - 2. Extend underlayment vertically up wall behind flashing.
  - 3. Solder all joints.
  - 4. Apply sealant.

## 3.2 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

# SECTION 07 6220 STAINLESS STEEL FLASHING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install stainless steel flashing at mechanical enclosure wall caps as described in Contract Documents
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealant'.

#### 1.2 REFERENCES

#### A. Definitions:

- Stainless Steel: Stainless steels are alloys of iron to which at least 10 percent chromium has been added to
  increase corrosion resistance and will not rust when exposed to weather. To obtain greater corrosion resistance,
  more nickel and chromium are added to the alloy. Along with iron and chromium, all stainless steels contain
  some carbon to make it stronger.
  - a. Austenitic Stainless Steel: Most popular of the stainless steels because of their ductility, ease of working and good corrosion resistance. Widely known as the 300 series.
- 2. Stainless Steel Alloys:
  - a. Type 302 (UNS S30200): Austenitic stainless steel that provides good corrosion resistance and high strength. Often referred to as 18:8.
  - b. Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
  - c. Type 316 (UNS S31600): Austenitic chromium-nickel molybdenum stainless and heat resisting steel with non-magnetic properties that is more resistant to general corrosion and pitting than type 302-304. Also known as "marine grade" stainless steel due to its increased ability to resist saltwater corrosion compared to type 304.

# PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Materials:
  - Sheet Metal:
    - a. 0.018 inch thick AISI Type 304 stainless steel with No. 2 or 2B finish.

# 2.2 ACCESSORIES

- A. Sealant: Rubber base type conforming to Fed Spec TT-S-00230.
- B. Nails And Other Fasteners: Nails And Other Fasteners:
  - 1. Stainless steel fasteners meeting Type 304 (UNS S30400) or Type 316 (UNS S31600).
    - a. Use Type 316 (UNS S31600) within 15 miles of oceanside applications.
  - 2. Nails shall have angular threads, diamond point, 1/4 inch heads, and be of sufficient length to penetrate wood one inch minimum.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Install with small, watertight seams.
- B. Slope to provide positive drainage.
- C. Fold exposed edges 1/2 inch to provide stiffness.
- D. Provide minimum overlap of 3 inches.
- E. Bed overlapping joints in specified sealant.
- F. Isolate from dissimilar metals to prevent electrolytic action.
- G. Fasten coping to continuous metal hold-down clips attached to wood plate with screws at one foot on center.
- H. Miter, seam, and seal corners.

# 3.2 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

# SECTION 07 6310 STEEP SLOPE ROOF FLASHING: Asphalt Shingles

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Roof flashing including:
    - a. Formed Valley Metal.
    - b. Pipe flashing for vent piping and flues.
    - c. Roof jacks.
    - d. Saddles and curb flashings.
    - e. Miscellaneous flashing.

# B. Related Requirements:

- 1. Section 07 3113: 'Asphalt Shingles' for installation.
- 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants.
- 3. Division 22: Plumbing vent piping.
- 4. Division 23: HVAC flues and air piping.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
  - 2. ASTM International: (specifically referenced for pipe flashing only):
    - a. ASTM B117-16, 'Standard Practice for Operating Salt Spray (Fog) Apparatus'.
    - b. ASTM E283-04(2012), 'Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen'.
    - c. ASTM E330/E330M-14, 'Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference'.
    - d. ASTM E331-00(2016), 'Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference'.
    - e. ASTM E2140-01(2017), 'Standard Practice for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head'.

# 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Tests And Evaluation Reports:
    - a. Manufacturer's test reports:

# 1.4 WARRANTY

- A. Pipe Flashing:
  - Manufacturer's warranty against defects in materials and workmanship when correctly installed in appropriate
    application for life of original roofing material from installation or replacement or fifty (50) years whichever is
    greater.

#### PART 2 - PRODUCTS

# 2.1 MATERIALS

#### A. Manufacturers:

- 1. Type Two Acceptable Manufacturers:
  - a. CMG Coated Metals Group, Denver, CO www.cmgmetals.com.
  - b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
  - c. Fabral, Lancaster, PA www.fabral.com.
  - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
  - e. MBCI, Houston, TX www.mbci.com.
  - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
  - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
  - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
  - i. Ryerson, Chicago, IL www.ryerson.com.
  - j. Equal as approved by Architect before installation. See Section 01 6200.

# B. Formed Valley Metal And Drip Edge:

- 1. Metal:
  - a. Steel: Minimum 24 ga, hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft. or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi.

#### C. Fabrication:

- 1. Valley-ribbed flashing:
  - a. Form accurately to details. Provide formed valley metal in 10 foot lengths with one inch 'V' crimp and break in center to match roof slopes.
- 2. Profiles, bends, and intersections shall be even and true to line.

#### D. Finishes:

- Face coating polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal
- 2. Reverse side coating of steel flashings to be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
- 3. Color as selected by Architect from Manufacturer's standard colors.

#### 2.2 ACCESSORIES

- A. Pipe Flashing For Plumbing Vent Lines metal flues, and HVAC Air Piping:
  - a. Description:
  - 2. Ultra-pure high consistency molded one hundred (100) percent silicone rubber pipe boot that prevents cracking and splitting for life of roof.
    - a. Design Criteria:
    - b. Meet following Tests:
      - 1) ASTM B117 (Salt Spray Test).
      - 2) ASTM E283 (Air Leakage).
      - 3) ASTM E 330 (Uniform Structural Load).
      - 4) ASTM E331 (Water Penetration).
      - 5) ASTM E2140 (Water).
    - c. Material warranty of product for life of roof.
  - 3. 24 ga coated galvanized steel plate.
  - 4. Minimum 4 inch flashing on each side, 6 inch flashing at top, 3 inch flashing at bottom with nailing slots.
  - 5. UV stable solid molded PVC compression collar.
  - 6. Use Ultimate Pipe Flashing for PVC, ABS and IP.
  - 7. Sizes: 1-1/4 inch, 1-1/2 inch, 2 inch, 3 inch, and 4 inch.
  - 8. Slope: Flat to 18/12 pitch.
  - 9. Flashing Finish: Face coating polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500) for coil coating components containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat

- system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
- 10. Color: Brown (no other color available).
- 11. Category Four Approved System Manufacturers. See Section 01 6200 for definitions of Categories:
  - a. Ultimate Pipe Flashing by Lifetime Tool & Building Products LLC, Winchester, VA www.lifetimetool.com (877) 904-1002.
- B. Roof Jacks For Metal Flues: Factory-made galvanized steel.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with pipe installers for proper size of roof jacks and pipe flashing.
- B. Pipe Flashing:
  - 1. Follow Manufacturer's installation instructions.

END OF SECTION

# SECTION 07 6311 METAL SOFFIT PANELS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal soffit panel system as described in Contract Documents.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. American Architectural Manufacturers Association:
    - a. AAMA 1402-09, 'Standard Specification for Aluminum Siding Soffit and Fascia'.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
    - c. ASTM B209-14, 'Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate'.
    - d. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet for products furnished.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire Characteristics Performance Requirement:
    - a. Meet requirements of ASTM E84 Class A fire rating.
- B. Qualifications:
  - 1. Installer:
    - a. Minimum three (3) years' experience with installations of comparable quality, scope, similar size, and complexity before bidding.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Inspect delivered material for damage.

- B. Storage And Handling Requirements:
  - Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
  - 2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

# 1.6 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard warranty against manufacturer defects.
  - 2. Manufacturer's written thirty five (35) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

# PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers Of Metal:
    - a. AEP / Span, Dallas, TX www.aep-span.com.
    - b. ATAS Aluminum Products, Allentown, PA www.atas.com.
    - c. Fabral, Lancaster, PA www.fabral.com.
    - d. Fashion Inc, Ottawa, KS www.fashioninc.com.
    - e. Firestone Metal Products, Anoka, MN www.unaclad.com.
    - f. MBCI, Houston, TX www.mbci.com.
    - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
    - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
    - i. Ryerson, Chicago, IL www.ryerson.com.
    - j. Equal as approved by Architect before bidding. See Section 01 6200.

# B. Performance:

- 1. Design Criteria:
  - a. Flush panel design.
    - 1) Panels shall be interlocked full length of panel.
    - 2) Panel widths shall be Manufacturer's standard.
  - b. Performance Standard: ATAS Wind-LOK Soffit MPS120.

## C. Materials:

- 1. 0.032 inch thick minimum 3105-H24 alloy aluminum meeting requirements of ASTM B209.
- 2. 24 ga (0.0276 in galvanized iron or steel meeting requirements of A653/A653M, G 90.
- 3. 24 ga (0.0276 in minimum 50 ksi galvalume steel meeting requirements of ASTM A792/A792M AZ-55.

#### D. Fabrication:

- 1. Panels shall be uniformly dimensioned, roll formed to lengths to avoid trimming.
- 2. Panel system shall be anchored as recommended by Manufacturer.
- 3. Panels shall be continuous.

## E. Finish:

- 1. Polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base (Kynar 500 or Hylar 5000) finish for coil coating components containing 70 percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
- 2. Color as selected by Architect from Manufacturer's standard colors.

# 2.2 ACCESSORIES

- A. Fastening Devices: 1-1/2 inch cadmium or zinc plated ring shanked nails.
- B. Continuous Soffit Vent:
  - 1. Type Two Acceptable Products:

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- a. Aluminum 9.9 sq in net free ventilation per lineal foot. Width: 2-1/4 inches. Color: white.
  - Mastic VAS79 Vent-A-Strip (Model 79) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.
- b. Equal as approved by Architect before installation. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify framing is suitable for installation of soffit system.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install soffit over unsuitable conditions.
    - b. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 INSTALLATION

- A. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.
- B. Isolate from dissimilar metals to prevent electrolytic action.

# 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

# 3.4 CLEANING

- A. General:
  - 1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.
- B. Waste Management:
  - Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

# END OF SECTION

METAL SOFFIT PANELS - 3 - 07 6311

# SECTION 07 6312 PERFORATED METAL SOFFIT

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install perforated metal soffit system at outside storage building as described in Contract Documents.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. American Architectural Manufacturers Association:
    - a. AAMA 1402-09, 'Standard Specification for Aluminum Siding Soffit and Fascia'.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
    - c. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet for products furnished.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire Characteristics Performance Requirement:
    - a. Meet requirements of ASTM E84 Class A fire rating.
- B. Qualifications:
  - 1. Installer:
    - a. Minimum three (3) years experience with installations of comparable quality, scope, similar size, and complexity before bidding.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Inspect delivered material for damage.

- B. Storage And Handling Requirements:
  - 1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
  - 2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

# 1.6 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's written 20-year guarantee for finish.

# PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Manufacturers
  - 1. Type One Acceptable Manufacturers:
    - a. Alcoa Architectural Products, Eastman, GA www.alcoaarchitecturalproducts.com.
    - b. Alside Inc, Cuyahoga Falls, OH www.alside.com.
    - c. ATAS Aluminum Products, Allentown, PA www.atas.com.
    - d. Gentek Building Products, Akron, OH and Burlington, ON www.gentekinc.com.
    - e. Kaycan Ltd, Montreal, QB www.kaycan.com.
    - f. Norandex/Reynolds, Macedonia, OH www.norandexreynolds.com.
    - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
    - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
    - i. System 3-12L by Rollex, Elk Grove Village, IL www.rollex.com.
    - j. Equal as approved by Architect before bidding. See Section 01 6200.

# B. Performance Requirements:

1. Capacities: Installed soffit system shall meet minimum required structural loading conditions when tested in accordance with Test Method No. 4 of AAMA Specification 1402-86.

# C. Materials:

- 1. 0.019 inch thick minimum.
- 2. 'V' groove design complete with matching trim.
- 3. Panels shall be interlocked full length of panel.
- 4. Perforated full width of panel with holes designed so one dimension does not exceed 1/8 inch.

#### D. Finish

- 1. Face finish shall meet performance requirements of Test Method No. 6 of AAMA Specification 1402-86. Reverse side coating shall pass requirements of paragraphs 1.1 through 1.4 of Test Method No. 6.
- 2. Double baked enamel to meet or exceed specifications of MIL-DTL-5541F with protective coating on back side.
- 3. Color as selected by Architect from Manufacturer's standard colors.

# 2.2 ASSESSORIES

- A. Fastening Devices:
  - 1. 1-1/4 inch galvanized staples or as recommended by Soffit Manufacturer.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify framing is suitable for installation of soffit system.
  - 2. Notify Architect of unsuitable conditions in writing.

- a. Do not install soffit over unsuitable conditions.
- b. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 INSTALLATION

- A. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.
- B. Isolate from dissimilar metals to prevent electrolytic action.

#### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

#### 3.4 CLEANING

- A. General:
  - 1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.
- B. Waste Management:
  - 1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

# SECTION 07 6322 STEEL FASCIA

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal fascia as described in Contract Documents.

#### 1.2 REFERENCES

- A. Reference Standards:
  - ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
    - c. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - Product Data:
    - a. Manufacturer's literature or cut sheet for products furnished.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire Characteristics Performance Requirement:
    - a. Meet requirements of ASTM E84 Class A fire rating.
- B. Qualifications:
  - 1. Installer:
    - a. Minimum three (3) years' experience with installations of comparable quality, scope, similar size, and complexity before bidding.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Inspect delivered material for damage.
- B. Storage And Handling Requirements:
  - 1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
  - 2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

#### 1.6 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard warranty against manufacturer defects.
  - Manufacturer's written thirty five (35) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers Of Metal:
    - a. AEP / Span, Dallas, TX www.aep-span.com.
    - b. ATAS Aluminum Products, Allentown, PA www.atas.com.
    - c. CMG Coated Metals Group, Denver, CO www.cmgmetals.com.
    - d. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
    - e. Fabral, Lancaster, PA www.fabral.com.
    - f. Firestone Metal Products, Anoka, MN www.unaclad.com.
    - g. Hunter-Douglas Canada Ltd, Brampton, ON www.hunterdouglasgroup.com.
    - h. Kaycan Ltd, Montreal, PQ (514) 334-7550 www.kaycan.com.
    - i. MBCI, Houston, TX www.mbci.com.
    - j. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
    - k. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
    - I. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com
    - m. Ryerson, Chicago, IL www.ryerson.com.
    - n. VicWest, Oakville, ON www.vicwest.ca
    - o. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials: Minimum 24 ga, hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi and complete with accessories recommended by Manufacturer for proper installation.
- C. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.
- D. Finishes:
  - 1. Face coating polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
  - Reverse side coating thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
  - 3. Color as selected by Architect from Manufacturer's standard colors.

#### 2.2 ACCESSORIES

- A. Fastening Devices: Galvanized steel screws.
- B. Continuous Soffit Vent:
  - 1. Type Two Acceptable Products:
    - a. Aluminum 9.9 sq in net free ventilation per lineal foot. Width: 2-1/4 inches. Color: white.
      - Mastic VAS79 Vent-A-Strip (Model 79) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.
    - b. Equal as approved by Architect before installation. See Section 01 6200.

STEEL FASCIA - 2 - 07 6322

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify framing is suitable for installation of fascia.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install fascia over unsuitable conditions.
    - b. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 INSTALLATION

- A. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.
- B. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.
- C. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.

# 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

# 3.4 CLEANING

- A. General:
  - 1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.
- B. Waste Management:
  - 1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

STEEL FASCIA - 3 - 07 6322

# SECTION 07 7123 MANUFACTURED GUTTERS AND DOWNSPOUTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install gutters and downspouts as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealant', for quality of sealants for joints.

#### 1.2 REFERENCES

- A. Reference Standard:
  - 1. Sheet Metal & Air Conditioning Contractors National Association Inc:
    - a. SMACNA Architectural Sheet Metal Manual, (7th edition 2012).

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Show gutter cross-section, mounting method, gauge of metal, expansion joint design and locations, and downspout locations minimum.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Type Two Acceptable Manufacturers of Metal:
    - a. ATAS Aluminum Products, Allentown, PA www.atas.com.
    - b. CMG Coated Metals Group, Denver, CO www.cmgmetals.com.
    - c. Fabral, Jackson, GA www.fabral.com.
    - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
    - e. MBCI. Houston. TX www.mbci.com.
    - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
    - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
    - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
    - i. Reynolds Metals Company, Richmond, VA www.rmc.com.
    - j. Ryerson, Chicago, IL www.ryerson.com.
    - k. Equal as approved by Architect before installation. See Section 01 6200.

## B. Materials

- 1. Steel:
  - a. Downspouts: Rectangular, 26 ga0.0217 inches -galvanized steel including necessary elbows.
  - b. Gutters: 24 ga0.0276 inches galvanized steel.
  - c. Brackets: 22 ga0.0336 inches galvanized steel or 26 ga0.0217 inches double-hemmed minimum.
- 2. Screws, Bolts, Nails, And Accessory Fasteners: Non-corrosive and of strength and type consistent with function.
- 3. Downspouts, gutters, brackets, fasteners, and accessories shall be compatible material.

#### C. Fabrication:

- 1. Fabricate in accordance with SMACNA Architectural Manual recommendations, where applicable.
- 2. Cross-sectional configuration of gutter shall be Style A, (Page 1.13 6th Edition) of SMACNA Architectural Manual.

- 3. Form accurately to details.
- 4. Profiles, bends, and intersections shall be even and true to line.

#### D. Finishes:

- Metal exposed to view shall have face coating of polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula.
  - a. Thermo-cured two (2) coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
  - b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
- 2. Color as selected by Architect from Manufacturer's standard colors.

## PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Protection Of In-Place Conditions:
  - 1. Before starting work, verify governing dimensions at building. Inspect for conditions that would prevent installation of specified system. Do not install over improper conditions.
  - 2. Insulate work from fascia as necessary to prevent electrolytic action.

# 3.2 INSTALLATION

- A. Lap joints in downspouts 1-1/2 inches minimum in direction of water flow.
- B. Lap joints in gutter one inch minimum, apply sealant in lap, and stainless steel rivet one inch on center maximum.

# 3.3 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. At completion of this work, block downspouts and flood gutters.
  - 2. Notify Architect two (2) working days before testing.
  - 3. Repair leaks and adjust for proper drainage.

# 3.4 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

# END OF SECTION

# SECTION 07 7226 RIDGE VENTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish ridge vent system and installed under other Sections as described in Contract Documents.
    - a. Lightning Rod Cover Plate.
- B. Related Requirements:
  - 1. Section 07 3113: 'Asphalt Shingles' for ridge vent installed over Asphalt Shingle roofing.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants'.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Net Free Area (NFA): Total unobstructed area (adjusted for insect screen, louvers and weather coverings) through which air can pass through a vent; generally measured in square inches. All non-powered vents have a Net Free Area rating.
- B. Reference Standards:
  - ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
    - c. ASTM C920-14, 'Standard Specification for Elastomeric Joint Sealants'.
  - 2. International Building Code (IBC) (2015 or latest adopted edition):
    - a. Chapter 12, 'Interior Environment':
      - 1) Section 1203, 'Ventilation':
        - a) 1203.2, 'Attic Spaces'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference held jointly with Section 07 3113.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - Review Ridge Vent Manufacturers ventilation cutout requirements on roof deck and location of ventilation cutouts shown on Contract Documents.
- B. Sequencing:
  - 1. Coordinate installation with roof membrane.
  - 2. Installation of ridge vent system.

#### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Design details.
    - b. Published ridge vent installation instructions.
    - c. Storage and handling requirements.

- B. Informational Submittals:
  - Certificates:
    - a. Manufacturer's Certificates of compliance showing products meet or exceed specified requirements.
  - 2. Tests And Evaluation Reports:
    - a. Manufacturer's test reports.
    - b. Wind speed coverage for warranted wind speed.
  - 3. Special Procedure Submittals:
    - a. Contact Owner's Representative (FM Group or Project Manager) for following information:
      - 1) Installer to include following mandatory information for Warranty Information to be given to Ridge Vent Manufacturer to be added to Manufacturer Warranty included with Closing Submittals:

a)	Name of Owner (name of FM Group)
b)	Mailing Address (FM office address)
c)	Property ID
d)	Site address:
e)	Installation of Ridge Vent (or Roof Completion) Date

- f) Any addition data required from Ridge Vent Manufacturer.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty including Installer project information.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Ridge Vent System.
- B. Qualifications:
  - Manufacturer:
    - a. Company specializing in manufacturing products specified with this section with at least five (5) years experience and no known failures of specified product manufactured.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver products job site in original unopened containers or wrappings.
  - 2. Deliver materials in sufficient quantities to allow continuity of work.
- B. Storage And Handling Requirements:
  - 1. Storage Requirements:
    - a. Follow Manufacturer's instructions and precautions for storage of materials.
    - b. Protect materials from physical damage in a clean, dry, well vented, and protected location.
  - 2. Handling Requirements:
    - a. Handle material so as to prevent damage.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. General:
    - a. Ridge vent system will provide calculated net free area (NFA) stated design.
    - b. Warranty starts at completion of installation.
    - c. Warranty covers replacement cost excluding labor and any costs involved with repairing or replacing other roofing or building materials.
  - 2. Manufacturer's thirty (30) year warranty covering:
    - a. Kynar 500 paint and finish warranty covering color fade, chalk, and film integrity for ridge vent system.
  - 3. Manufacturer's twenty (20) year warranty covering:
    - a. Ridge vent system to be free from defects that will affect its performance.
    - b. Ridge vent system will withstand winds up to 120 mph average wind speed.
    - c. Ridge vent system will withstand snow load.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category One VMR Products And Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Metal-Era Airflow Solutions, Waukesha, WI www.metalera.com.
      - 1) Contact Information: Alissa Kuether-Bonlender (800) 558-2162 thechurch@metalera.com.
    - b. Western Metal Products, LC, Woods Cross, UT www.westernmetalproducts.com.
      - 1) Contact Information: James Rohletter, phone (888) 298-3454, email rvbid@westernmetalproducts.com.

#### B. Materials:

- 1. Description / Design Criteria:
  - a. Ridge Vent:
    - 1) Basis of Design:
      - a) Basis of Design Approved Product:
        - (1) LDS HI-PERF High Velocity Ridge Vent by Metal-Era.
        - Basis of Design Approved Equivalent Product:
          - (1) Ridge Vent by Western Metal.
    - 2) Design Criteria:
      - a) Not approved on roof mean heights greater than 33 feet.
      - b) Weather-proof and bug-proof ventilation system.
      - c) Withstand winds up to 120 mph average wind speed.
      - d) Provide net free area (NFA) requirements as determined by vented roof deck system and eave condition as indicated on Contract Drawings.
    - 3) Slope to Slope Version:
      - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Model HPSS by Metal-Era.
        - (2) Model: ASRP2 by Western Metal.
    - 4) Net free area (NFA):
      - a) Net free area: 48 sq. in. per lineal foot.

## 2. Components:

- a. Category Four Approved Product:
  - 1) Basis of design for System Components for this Project is Metal-Era Ridge Vent.
  - 2) Basis of design approved equivalent system components for this Project is Western Metal.
- b. Ridge vent system comprising of following:
  - 1) Cover plate 8 inchwide at each joint over ridge vent cover.
  - 2) Continuous deflector with baffle.
  - 3) Continuous Z bracket with intermittent spacer at 12 inch on center to supporting ridge cover.
  - 4) End cap / cover plate.
  - 5) Expanded metal support screen.
  - 6) Fasteners.
  - 7) Intermittent spacers at 12 inch on center directly under ridge vent cover.
  - 8) Ridge vent cover in 12 feet length.
- c. Metal:
  - 1) 24 ga (0.0276 in minimum hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz per sq ft or galvalume meeting requirements of ASTM A792/A792M AZ50.
- d. Expanded metal support screen:
  - 1) 0.050 inch3003-H14 formed aluminum with minimum of 48 percent open area.
- e. Z brackets: 20 gauge (0.0396 in G90 galvanized steel.
- f. Deflector: 24 ga (0.0276 in minimum.

## C. Finishes:

- 1. Ridge vent and accessories:
  - a. Polyvinylidene Fluoride (PV<sub>2</sub>) Resin-base finish (Kynar 500) for coil coating components containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
  - b. Approved Color: Medium Bronze.

#### 2.2 ACCESSORIES

- A. Ridge Vent System:
  - 1. End Caps, Cover Plates, and other accessories necessary for proper installation.

# B. Fasteners:

- 1. Ridge vent fastened to structure:
  - a. Category Four Approved Fasteners:
    - 1) Basis of design: Metal-Era Ridge Vent.
    - 2) Basis of design approved equivalent: Western Metal.
  - b. Fasteners shall be approved by Ridge Vent Manufacturer and provide minimum pull out resistance of 240 lbf into substrate when tested in accordance with TAS 105 test protocol:
    - New Building:
      - a) #9 1-1/2 inches stainless steel screws.
      - b) Provided by Manufacturer.
  - c. No nailing permitted.

#### C. Sealant:

- Description:
  - a. Weathersealing expansion, contraction, perimeter, and other movement joint sealant.
- 2. Design Criteria:
  - a. As specified in Section 07 9213 'Elastomeric Joint Sealants'.
  - b. Meet following standards for Sealant:
    - 1) ASTM C920: Type S Grade NS, Class 25 (min) Use O.
    - 2) 100 percent silicone.
- 3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Dow Corning: 790 Silicone Building Sealant.
  - Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
  - c. Tremco: Tremsil 600 Silicone Sealant.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify Ridge Vent Manufacturers ventilation cutout requirements on roof deck and location of ventilation cutouts shown on Contract Documents to verify correct location for all cutouts.
    - a. Make adjustments to ventilation cutouts if necessary before installation of ridge vent.
  - 2. Examine deck to determine if it is satisfactory for installation of ridge vent system.
    - a. Conditions include, but are not limited to, moisture on deck and protruding deck fasteners.
    - b. Verify substrate is dry, clean and free of foreign matter.
  - 3. Do not begin installation until substrates have been properly prepared.

# 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Clean roof sheathing, including removal of dirt, shingle nails, and debris, before installation of ridge vent system.

# 3.3 INSTALLATION

- A. Ridge Vent:
  - 1. Install in accordance with IBC Section 1503.2 'Flashing'.
  - 2. Install in accordance and as shown with Manufacturer's installation instructions for assembly of components and attachment to roof deck:
  - 3. Use provided fasteners consistent with manufacturer's instructions, suitable for substrate to which it is being installed.

- 4. Attach to roof/wall structure with stainless steel screws provided by Manufacturer at spacing required by Manufacturer. All nail heads and vent section joints shall be sealed with silicone sealant.
- 5. Remove protective film before applying sealant.
- 6. Apply sealants as per Manufacturer's installation instructions.

# 3.4 PROTECTION

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

# 3.5 CLEANING

- A. General:
  - 1. Properly clean finished roof surface after completion.
- B. Waste Management:
  - 1. Disposal:
    - a. General:
      - 1) Remove debris resulting from work of this Section from roof and site. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

**END OF SECTION** 

RIDGE VENTS - 5 07 7226

# SECTION 07 9213 ELASTOMERIC JOINT SEALANTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
  - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Requirements:
  - 1. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.
  - 2. Section 07 2419: Sealants for EIF Systems.
- C. Products Furnished But not Installed Under This Section:
  - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
  - 1. Section 09 3013: 'Ceramic Tiling'.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Sealant Types and Classifications:
    - a. ASTM Specifications:
      - 1) Type:
        - a) Type S: Single-component sealant.
        - Type M: Multi-component sealant.
      - 2) Grade:
        - a) Grade P: Pourable or self-leveling sealant used for horizontal traffic joints.
        - b) Grade NS: Non-sag or gunnable sealant used for vertical and non-traffic joints.
      - 3) Classes: Represent movement capability in percent of joint width.
        - a) Class 100/50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand of at least 100 percent increase and decrease of at least 50 percent of joint width as measured at time of application.
        - b) Class 50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 50 percent of joint width as measured at time of application.
        - c) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
        - d) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.
      - 4) Use:
        - a) T (Traffic): Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
        - b) NT (Non-Traffic): Sealant designed for use in joints in non-traffic areas.
        - c) I (Immersion): Sealant that meets bond requirements when tested by immersion (Immersion rated sealant applications require primer).
        - d) M (Mortar): Sealant that meets bond requirements when tested on mortar specimens.
        - e) G (Glass): Sealant that meets bond requirements when tested on glass specimens.
        - A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.
        - g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.

2. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature minus 100 deg F to + 600 deg F

## B. Reference Standards:

- ASTM International:
  - a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
  - b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
  - ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
  - d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
  - e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Scheduling:

- 1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
- 2. Ensure sealants are cured before covering with other materials.

#### 1.4 SUBMITTALS

# A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - b. Manufacturer's literature for each Product.
  - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.

## B. Informational Submittals:

- 1. Certificates:
  - a. Manufacturer's Certificate:
    - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
    - 2) Certificate from Manufacturer indicating date of manufacture.
- 2. Manufacturers' Instructions:
  - a. Manufacturer's installation recommendations for each Product.
  - b. Manufacturer's installation for completing sealant intersections when different materials are joined.

# 1.5 QUALITY ASSURANCE

#### A. Qualifications:

- 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
- 2. Applicator Qualifications:
  - a. Company specializing in performing work of this section.
  - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity and approved by manufacturer.
  - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.

#### B. Preconstruction Testing:

1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.

#### C. Mockups:

- 1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
  - a. Incorporate accepted mockup as part of Work.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
  - 1. Deliver and keep in original containers until ready for use.
  - 2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:
  - 1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
  - 2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
  - Store in a cool dry location, but never under 40 deg F or subjected to sustained temperatures exceeding 90 deg F
    or as per Manufacturer's written recommendations.
  - 4. Do not use sealants that have exceeded shelf life of product.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
  - 2. Follow Manufacturer's temperature recommendations for installing sealants.

#### 1.8 WARRANTY

- A. Manufacturer Warranty:
  - Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
    - a. Manufacturer's standard warranty covering sealant materials.
    - b. Applicator's standard warranty covering workmanship.

## PART 2 - PRODUCTS

# 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
    - b. Franklin International, Inc. Columbus, OH www.titebond.com.
    - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
    - d. Laticrete International Inc., Bethany, CT www.laticrete.com.
    - e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
    - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
    - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
    - h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.

## B. Materials:

- 1. Design Criteria:
  - a. Compliance: Meet or exceed requirements of these standards:
    - 1) ASTM C920: Elastomeric joint sealant performance standard.
    - 2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
  - b. Comply with Manufacturer's ambient condition requirements.
  - c. Sealants must meet Manufacturer's shelf-life requirements.
  - d. Sealants must adhere to and be compatible with specified substrates.
  - e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
  - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):

- 1) Adhesion Test:
  - a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
- 2) If Primer required, shall not stain and shall be compatible with substrates.
- 3) Allow primer to dry before applying sealant.
- 2. Sealants At Exterior Building Elements:
  - a. Description:
    - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
      - a) Aluminum entrance perimeters and thresholds.
      - b) Columns.
      - c) Connections.
      - d) Door frames.
      - e) EIFS to metal joints.
      - f) Joints and cracks around windows.
      - g) Louvers.
      - h) Masonry.
      - i) Wall penetrations.
      - j) Other joints necessary to seal off building from outside air and moisture.
  - b. Design Criteria:
    - 1) Meet following standards for Sealant:
      - a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
    - 2) Limitations:
      - Do not use below-grade applications.
      - b) Do not use on surfaces that are continuously immersed or in contact with water.
      - c) Do not use on wet, damp, frozen or contaminated surfaces.
      - Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
    - 3) Color:
      - a) Architect to select from Manufacturer's standard colors.
      - b) Match building elements instead of window (do not use white that shows dirt easily).
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dow Corning:
      - a) Primer: 1200 Prime Coat.
      - b) Sealant: 791 Silicone Weatherproofing Sealant.
    - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
      - a) Primer: SS4044 Primer.
      - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
    - 3) Tremco:
      - a) Primer:
        - (1) Metal surface: No. 20 primer.
        - (2) Porous surfaces: No. 23 primer.
      - b) Sealant: Spectrum 1 Silicone Sealant.
- 3. Sealants At EIFS:
  - a. Description:
    - Weatherproofing sealant for long term resistance to natural weathering, including: ultraviolet radiation, high and low temperatures and rain and snow, with negligible change in elasticity. May be used for application to horizontal or vertical surfaces.
  - b. Design Criteria:
    - 1) Meet following standards for Sealant:
      - a) Used to seal EIFS to EIFS, not EIFS to other material.
      - b) ASTM C920: Type S, Grade NS, Class 100/50 Use NT, A, G, O.
      - c) ASTM C1481 guidelines for use of sealant with EIFS.
    - 2) Limitations:
      - a) Do not use in structural glazing applications.
      - b) Do not use on surfaces that are underwater or in continuous contact with water.
      - c) Do not use on porous substrates.
      - d) Do not use on wet, damp, frozen or contaminated surfaces.
      - e) Do not use on surfaces where staining or discoloration may be concern, without prior testing.
      - f) Do not use on excessively basic or acidic substrates.

- 3) Color:
  - a) Architect to select from Manufacturer's standard colors.
  - b) Match building elements (do not use white that shows dirt easily).
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Dow Corning:
    - a) Primer: 1200 Prime Coat.
    - b) Sealant: 790 Silicone Building Sealant.
  - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
    - a) Primer: SCP3195P Primer.
    - b) Sealant: GE SCS2700 SilPruf LM Silicone Weatherproofing Sealant.
  - 3) Sika:
    - a) Primer: Sikaflex Primer 429.
    - b) Sealant: Sikaflex 2C NS Non-Sag Silicone Sealant.
  - 4) Tremco:
    - a) Primer: Porous surfaces: No. 23 primer.
    - b) Sealant: Spectrum 1 Silicone Sealant.
- 4. Sealants At Exterior Sheet Metal And Miscellaneous:
  - a. Description:
    - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
      - a) Flashings.
      - b) Gutters.
      - c) Penetrations in soffits and fascias.
      - d) Roof vents and flues.
  - b. Design Criteria:
    - 1) Meet following standards for Sealant:
      - a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.
    - 2) Limitations:
      - a) Do not use below-grade applications.
      - b) Do not use on surfaces that are continuously immersed or in contact with water.
      - c) Do not use on wet, damp, frozen or contaminated surfaces.
      - Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dow Corning: 790 Silicone Building Sealant.
    - Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
  - 3) Tremco: Tremsil 600 Silicone Sealant.
- Sealants At Expansion Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
  - a. Expansion Joints:
    - 1) Design Criteria:
      - a) Meet following standards for Sealant:
        - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
    - 2) Sealant required at expansion for following areas:
      - a) Between entryway slabs and building foundations.
      - b) Between sidewalks and building foundations.
      - c) Between aprons and building foundations.
      - d) Miscellaneous vertical applications.
    - 3) Sealant NOT required at expansion joints for following areas:
      - a) Within aprons and where aprons abut sidewalks.
      - b) Within mowstrips and where mowstrips abut sidewalks.
      - c) Within sidewalks.
    - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Dow Corning:
        - (1) Primer: 1200 Prime Coat.
        - (2) Sealant: 790 Silicone Building Sealant.
      - b) Sika:
        - (1) Primer: Sikasil Primer-2100.
        - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
  - b. Penetrations thru Concrete Walls:
    - Design Criteria:
      - a) Meet following standards for Sealant:

- (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) Dow Corning:
    - (1) Primer: 1200 Prime Coat.
    - (2) Sealant: 790 Silicone Building Sealant.
  - b) Sika:
    - (1) Primer: Sikasil Primer-2100.
    - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
- 6. Sealants At Control Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
  - a. Control Joints:
    - 1) Design Criteria:
      - a) Meet following standards for Sealant:
        - (1) ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
    - 2) Sealant required at control joints in following areas:
      - a) Miscellaneous vertical applications.
    - 3) Sealant is NOT required at control joints, unless needed to protect moisture sensitive soils or by Contract Drawings, in following areas:
      - a) Within aprons.
      - b) Within mowstrips.
      - c) Within sidewalks.
      - d) Within entryway slabs.
    - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Dow Corning:
        - (1) Primer: 1200 Prime Coat.
        - (2) Sealant: 890-SL Silicone Building Sealant.
      - b) Sika:
        - (1) Primer: Primer: Sikasil Primer-2100.
        - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
- 7. Sealants At Curbs And Gutters:
  - a. Expansion Joints and Control Joints:
    - 1) Description:
      - a) Effective for sealing transverse contraction and expansion joints, longitudinal, center line and shoulder joints in Portland cement concrete.
      - b) One component (part) non-sag silicone material that cures to low modulus, silicone rubber upon exposure to atmospheric moisture. May be applied over wide temperature range.
    - 2) Design Criteria:
      - a) Expansion joint sealant is required in following areas:
        - 1) Within curbs and gutters at approved layout locations.
      - Meet following standards for Sealant: Non-sag: ASTM C920: Type S, Grade NS, Class 100/50, Use T. NT.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Dow Corning:
        - (1) Primer: 1200 Prime Coat.
        - (2) Sealant: 888 Silicone Joint Sealant.
      - b) Sika:
        - (1) Primer: Primer: Sikasil Primer-2100.
        - (2) Sikasil-728 NS Non-Sag Silicone Sealant.
- 8. Sealants At Precast Concrete Cap and Joint Covers (if Contractor Option ONE was selected in Section 03 4800):
  - a. Description
    - Soft lead strip, when set and bedded in sealant, form cap which assures permanent elastic seal for any masonry joint as specified in Section 03 4800.
  - b. Design Criteria:
    - 1) Meet following standards for Sealant:
      - a) ASTM C920: Type S, Grade NS, Class 50 Use A, G, M.
      - b) Strips should be of sufficient size to cover the joint width, plus percentage allowance for anticipated joint movement, plus 1/4 inch
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dow Corning:
      - a) Primer: 1200 Prime Coat.
      - b) Sealant: 791 Silicone Weatherproofing Sealant.
    - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
      - a) Primer: SS4044 Primer.
      - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.

- 3) Sika:
  - a) Primer: Sikasil Primer-2100.
  - b) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
- 4) Tremco:
  - a) Primer:
    - (1) Metal surface: No. 20 primer.
    - (2) Porous surfaces: No. 23 primer.
  - b) Sealant: Spectrum 1 Silicone Sealant.
- General Interior Sealants:
  - a. General:
    - 1) Inside jambs and heads of exterior door frames.
    - 2) Both sides of interior door frames.
    - 3) Inside perimeters of windows.
    - 4) Miscellaneous gaps between substrates.
  - b. Design Criteria:
    - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
    - 2) 100 percent silicone sealant.
  - c. Non-Paintable Sealant (Installer Option A):
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
      - b) Laticrete: Latasil Silicone Sealant.
      - Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
      - d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
      - e) Tremco: Tremsil 200 Silicone Sealant.
      - f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
  - d. Paintable Sealant (Installer Option B):
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.
- 10. Sealants For Interior Joints:
  - a. General:
    - 1) Countertops and backsplash to wall.
    - 2) Sinks and lavatories to countertops.
    - 3) Joints between plumbing fixtures and other substrates.
  - b. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
    - 1) Ceramic tile inside corners.
    - 2) Ceramic tile and paver tile joints.
    - 3) Termination joints in font.
  - c. Description:
    - 1) One-part acetoxy cure silicone sealant with fungicides to resist mold and mildew.
  - d. Design Criteria:
    - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
    - 2) 100 percent silicone sealant.
  - e. Color: As selected by Architect from Manufacturer's standard colors.
  - f. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
    - 2) Laticrete: Latasil Tile and Stone Silicone Sealant.
    - 3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
    - 4) Tremco: Tremsil 200 Silicone Sealant.

# 2.2 ACCESSORIES

- A. Bond Breaker Tape:
  - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
  - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
  - 1. Comply with ASTM C1330.

- 2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
- 3. Oversized 25 to 50 percent larger than joint width.

#### C. Joint Cleaner:

 Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.

## D. Masking Tape:

1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

#### A. Verification Of Conditions:

- 1. Examine substrate surfaces and joint openings are ready to receive Work.
  - a. Verify each sealant is compatible for use with joint substrates.
  - b. Verify joint surfaces are clean and dry.
  - c. Ensure concrete surfaces are fully cured.
- 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
- 3. Notify Architect of unsuitable conditions in writing.
  - a. Do not proceed until unsatisfactory conditions are corrected.
- 4. Commencement of Work by installer is considered acceptance of substrate.

#### 3.2 PREPARATION

#### A. Surface Preparation:

- 1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
  - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
  - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
  - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
  - d. Primers:
    - 1) Primers enhance adhesion ability.
    - 2) Use of primers is not a substitution for poor joint preparation.
    - 3) Primers should be used always in horizontal application where there is ponding water.
- 2. Field test joints in inconspicuous location.
  - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
  - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
- 3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

#### B. Joints:

- 1. Prepare joints in accordance with ASTM C1193.
  - a. Clean joint surfaces of contaminates capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
  - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
  - c. Clean concrete joint surfaces to remove curing agents and form release agents.

# C. Protection:

1. Protect elements surrounding the Work of this section from damage or disfiguration.

#### 3.3 APPLICATION

#### A. General:

- 1. Apply silicone sealant in accordance with Manufacturer's instructions.
- 2. Do not use damaged or deteriorated materials.
- 3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
- 4. Apply primer where required for sealant adhesion.
- 5. Install sealants immediately after joint preparation.
- 6. Do not use silicone sealant as per the following:
  - a. Apply caulking/sealant at temperatures below 40 deg F.
  - b. Below-grade applications.
  - c. Brass and copper surfaces.
  - d. Materials bleeding oils, plasticizers, and solvents.
  - e. Structural glazing and adhesive.
  - f. Surfaces to be immersed in water for prolonged time.

## Joint Backing:

- 1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
- 2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
- 3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch deep.

#### C. Bond Breaker:

- 1. Install bond breaker where joint backing is not used or where backing is not feasible.
  - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.

## D. Sealant:

- 1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
- 2. Fill joint opening to full and proper configuration.
- 3. Apply in continuous operation.
- 4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
- 5. Depth of sealant bite shall be 1/4 inch minimum and 1/2 inch maximum, but never more than one half or less than one fourth joint width.
- E. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch between painted or coated substrates.

#### 3.4 TOLERANCES

A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

# 3.5 FIELD QUALITY CONTROL

- A. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
  - Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
    - a. Perform five (5) tests for first 1,000 linear feet of applied silicone sealant and one (1) test for each 1,000 linear feet seal thereafter or perform one (1) test per floor per building elevation minimum.
    - b. For sealants applied between dissimilar materials, test both sides of joints.
  - Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
  - 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

# 3.6 CLEANING

- A. Remove masking tape and excess sealant.
- B. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.
- C. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

## SECTION 07 9219 ACOUSTICAL JOINT SEALANTS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Quality of sealants to be used at perimeters of and penetrations through acoustically insulated walls and associated ceilings.
- B. Related Requirements:
  - 1. Section 09 2900: Furnishing and installing of acoustical sealants.

### 1.2 REFERENCES

#### A. Definitions:

- Sealant. Sealants are generally used in applications where elastic properties are needed while adhesives are generally used in applications where bonding strength and rigidity are needed. With technology advancements both sealants and adhesives can be used interchangeably depending on the applications performance requirements.
- 2. Sealant Types and Classes:
  - a. Federal Specifications:
    - 1) Type I: Self-leveling, pour grade.
    - 2) Type II: Non-sag, gun grade.
    - 3) Type NS: Non-sag, gun grade.
    - 4) Class A: +25 percent, -25 percent expansion contraction.
  - b. ASTM Specifications:
    - 1) Type S: Single-component sealant.
    - 2) Type M: Multi-component sealant.
    - 3) Grade P: Pourable or self-leveling sealant for joints on horizontal surfaces.
    - 4) Grade NS: Non-sag or gunnable sealant for joints in vertical surfaces.
    - 5) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
    - 6) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.
    - T: Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
    - 8) NT: Sealant designed for use in joints in non-traffic areas.
    - 9) M: Sealant will remain adhered to mortar.
    - 10) G: Sealant will remain adhered to glass.
    - 11) A: Sealant will remain adhered to aluminum.
    - 12) O: Sealant will remain adhered to substrates other than glass, aluminum, mortar.

#### B. Reference Standards:

- 1. ASTM International:
  - a. ASTM C834-17, 'Standard Specification for Latex Sealants'.
  - b. ASTM C919-12(2017), 'Standard Practice for Use of Sealants in Acoustical Applications'.
  - c. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
  - d. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - e. ASTM E90-09(2016), 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements'
- 2. Underwriters Laboratories, Inc.:
  - UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials; Tenth Edition 2008.'

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - Product Data:
    - a. Manufacturer's literature for each Product.
- B. Informational Submittals:
  - Certificates:
    - a. Manufacturer's Certificate:
      - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
      - 2) Certificate from Manufacturer indicating date of manufacture.
  - !. Manufacturers' Instructions:
    - a. Manufacturer's installation recommendations for each Product.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Surface-Burning Characteristics:
    - a. Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
      - 1) Class A (Flame spread index 0-25; Smoke-developed index 0-450).

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver and keep in original containers until ready for use.
  - 2. Inspect for damage or deteriorated materials.
- B. Storage And Handling Requirements:
  - 1. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
  - 2. Store in cool, dry location, and at temperatures never under 40 deg F nor exceeding80 deg F.

## 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not apply caulking at temperatures below 40 deg F.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Sealants:
  - 1. Design Criteria:
    - a. Meet requirements of ASTM C834.
    - b. Meet Class A flame spread rating.
  - 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. OSI Pro-Series SC-175 Draft & Acoustical Sound Sealant by OSI Sealants Inc, Mentor, OH www.osisealants.com.
    - b. QuietZone Acoustic Caulk by Owens Corning, Toledo, OH www.owenscorning.com.
    - c. Acoustical Sealant by Tremco, Beachwood, OH www.tremcosealants.com or Toronto, ON (800) 363-3213.
    - d. Acoustical Sound Sealant by Titebond.
    - e. Acoustical Sealant by U S Gypsum, Chicago, IL www.usg.com.

## 2.2 ACCESSORIES

A. Bond Breaker: Pressure sensitive tape recommended by Sealant Manufacturer to suit application.

- B. Joint Backing:
  - Flexible closed cell polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
  - 2. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner: Non-corrosive and non-staining type, recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape: Pressure sensitive tape recommended by Sealant Manufacturer to suit application.
- E. Primer: Non-staining type, type, recommended by Sealant Manufacturer to suit application.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate surfaces and joint openings are ready to receive Work.
  - 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
  - 3. Notify Architect of unsuitable conditions in writing.
    - a. Do not proceed until unsatisfactory conditions are corrected.
  - 4. Commencement of Work by installer is considered acceptance of substrate.

#### 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Prepare joints in accordance with ASTM C1193 and Manufacturer's instructions.
  - 2. Clean joint surfaces to remove dirt, dust, oils, wax, paints, and other contamination capable of affecting primer and sealant bond.
  - 3. Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.
- B. Surface Preparation:
  - 1. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface.
  - 2. Surfaces shall be clean, dry, and free of dust, oil, grease, dew, or frost.

## 3.3 INSTALLATION

- A. General:
  - 1. Do not use damaged or deteriorated materials.
  - 2. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions where required for sealant adhesion.
  - 3. Install sealants immediately after joint preparation.
  - 4. Do not apply caulking/sealant at temperatures below 40 deg F.
- B. Joint Backing:
  - 1. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch deep.
  - 2. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- C. Install at perimeter joints and mechanical and electrical penetrations in sound insulated rooms. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint.
- D. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.

E. Depth of sealant bite shall be 1/4 inch minimum and 1/2 inch maximum, but never more than one half or less than one fourth joint width.

## 3.4 FIELD QUALITY CONTROL

- A. Inspection:
  - 1. Examine sealant joints to verify compliance with Contract Document requirements.
- B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - Sealant material found to be contaminated or damaged or inadequate preparation of substrate results in deficiencies in joint sealant adhesion is considered defective or not complying with Contract Document requirements.
  - 2. Correct any work found defective or not-complying with Contract Document requirements at no additional cost to Owner.

## 3.5 CLEANING

- A. General:
  - Remove sealant from adjacent surfaces in accordance with Sealant Manufacturer and Substrate Manufacturer recommendations as work progresses.
  - 2. Remove masking tape and any other foreign material.
  - 3. Clean adjacent materials that have been soiled immediately (before setting) as recommended by Manufacturer.
- B. Waste Management: Dispose of products in accordance with Sealant Manufacturer's recommendation.

END OF SECTION

## **NIBLEY 12 & MENDON UTAH STAKE CENTER**

#### **DIVISION 8 - OPENINGS:** 0000 80 Openings 08 0601 Hardware Group and Keying Schedules 08 1000 Doors and Frames Hollow Metal Frames 08 1213 08 1313 Hollow Metal Doors 08 1429 Pre-Finished Flush Wood Doors / Clear 08 3000 Specialty Doors and Frames 08 3110 Access Doors and Panels 08 4000 Entrances, Storefronts, and Curtain Walls Aluminum-Framed Entrances and Storefronts 08 4113 08 5000 Windows Vinyl Windows 08 5313 008 7000 Hardware 08 7101 Common Finish Hardware Requirements Hanging Devices 08 7102 Securing Devices 08 7103 08 7104 Operating Trim 08 7106 Closing Devices Protective Plates and Trim 08 7107 08 7108 Stops and Holders 08 7109 Accessories 08 7913 Key Storage and Control Equipment 08 8000 Glazing 08 8100 Glass Glazing

DIVISION 08 OPENINGS

# SECTION 08 0601 HARDWARE GROUP AND KEYING SCHEDULES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install door hardware and keying as described in Contract Documents.

#### 1.2 REFERENCES

#### A. Definitions:

- 1. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
  - a. F75 Passage Latch: Latch bolt operated by lever from either side at all times.
  - b. F76 Privacy Lock: Latch bolt operated by lever from either side. Outside lever locked by push button inside and unlocked by emergency key from outside or rotating lever from inside.
  - c. F81 Office Door Lock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked by turn button in inside lever. When outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever. Turn button must be manually rotated to unlock outside lever.
  - d. F84 Classroom Deadlock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever.
  - e. F86 Utility Space Door Lock: Dead locking latch bolt operated by key in outside lever or by rotating inside lever. Outside lever is always fixed.
  - f. F91 Store Door Lock: Deadlocking latch operated by either lever. Key in either lever locks / unlocks both levers.
  - g. F109 Entrance Lock: Turn/push button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked. Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever. Disengages outside spindle from latch when locked.
  - h. E2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown
  - E2152 Deadbolt: Dead bolt operated by key from outside and turn unit from inside. Bolt automatically dead locks when fully thrown.

## 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.

#### PART 2 - HARDWARE GROUPS

## 2.1 STOREFRONT ENTRY DOORS

- A. Single Doors:
  - 1. Group ST1:
    - a. 1 set: Pivots.
    - b. 1 set: Weatherstrip.
    - c. 1 each: Closer (with closer arm stop).
    - d. 1 each: Exit Device with dogging capability.
    - e. 1 each: Pull.
    - f. 1 each: Kick Plate.
    - g. 1 each: Threshold.

## Group ST1A:

- a. 1 set: Pivots.
- b. 1 set: Weatherstrip.
- c. 1 each: Exit Device with dogging capability.
- d. 1 each: Kick Plate.
- e. 1 each: Low-Energy Swing Door Operator.
- f. 1 each: Pull.
- 1 each: Threshold. g.

#### Group ST2:

- a. 1 set: Pivots.
- b. 1 set: Weatherstrip.
- c. 1 each: Closer (with closer arm stop).
- d. 1 each: Exit Device with dogging capability.
- e. 1 each: Kick Plate.
- 1 each: Pull. f.
- 1 each: High Security Cylinder.
- h. 1 each: Threshold.

## Group ST3:

- a. 1 set: Pivots.
- b. 1 set: Weatherstrip.
- 1 each: Closer (with closer arm stop).
- d. 1 each: Kick Plate.
- 1 each: Pull. e.
- 1 each: Push. f.
- 1 each: Threshold.

#### Group ST3A:

- a. 1 set: Pivots.
- b. 1 set: Weatherstrip.
- c. 1 each: Kick Plate.d. 1 each: Low-Energy Swing Door Operator.
- e. 1 each: Pull.
- 1 each: Push. f.
- 1 each: Threshold. g.

#### 2.2 **EXTERIOR DOORS**

## Single Exterior Doors:

## Group 1:

- a. 1 set: Weatherstrip.
- b. 3 each: Hinges.
- c. 1 each: Deadbolt, Function E2152.d. 1 each: Lockset Function F86.
- e. 1 each: Overhead Stop with Hold Open.
- 1 each: Threshold. f.

## Group 2:

- a. 1 set: Weatherstrip.
- b. 1 each: Closer (with closer arm stop).
- c. 1 each: Emergency Egress Exit Device (no exterior hardware or dogging capability).
- d. 3 each: Hinges.
- e. 1 each: Threshold.

## Group 3:

- a. 1 set: Weatherstrip.
- b. 3 each: Hinges.
- c. 1 each: Lockset Function F86.
- d. 1 each: Overhead Stop with Hold Open.
- e. 1 each: Threshold.

#### 2.3 **INTERIOR DOORS**

## Single Interior Doors:

## Group 20:

- a. 1 set: Smoke Gaskets.
- b. 3 each: Hinges.
- c. 1 each: Latchset Function F75.
- d. 1 each: Stop (See Door Schedule for type).

## Group 22:

- a. 1 set: Smoke Gaskets.
- b. 3 each: Hinges.
- c. 1 each: Lockset Function F86.
- d. 1 each: Stop (See Door Schedule for type).

#### 3. Group 23:

- a. 1 set: Smoke Gaskets.
- b. 3 each: Hinges.
- 1 each: Lockset Function F86.
- d. 1 each: Stop (See Door Schedule for type).
- 1 each: Threshold.

#### Group 24:

- a. 1 set: Smoke Gaskets.
  b. 3 each: Hinges.
  c. 1 each: Lockset Function F81.
  d. 1 each: Stop (See Door Schedule for type).

#### Group 26:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Acoustic Seal.
- c. 3 each: Hinges.
- d. 1 each: Lockset Function F81.
- e. 1 each: Stop (See Door Schedule for type).
- 1 each: Threshold. f.

## Group 28:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Closer.
- c. 3 each: Hinges.
- d. 1 each: Kick Plate.
- e. 1 each: Pull.
- f. 1 each: Push.
- 1 each: Stop (See Door Schedule for type).

## Group 28A:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Acoustic Seal.
- c. 1 each: Closer.
- d. 3 each: Hinges.
- e. 1 each: Latchset, Function F75.
- 1 each: Stop (See Door Schedule for type). f.
- 1 each: Threshold.

### Group 30:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Closer with hold open function.
- c. 3 each: Hinges.
- d. 1 each: Kick Plate.
- e. 1 each: Pull.
- 1 each: Push.
- 1 each: Stop (See Door Schedule for type).

## Group 32:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Closer.
- c. 3 each: Hinges.d. 1 each: Lockset, Function F76.
- e. 1 each: Stop (See Door Schedule for type).

## 10. **Group 35**:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Closer.
- c. 1 each: Deadbolt Function E2152.
- d. 3 each: Hinges.
- e. 1 each: Pull.
- f. 1 each: Push.
- 1 each: Stop (See Door Schedule for type). g.

#### 11. **Group 36**:

- a. 1 set: Smoke Gaskets.
- b. 1 each: Deadbolt Function E2152 (upper leaf).
- c. 4 each: Hinges (2 per leaf).
- d. 1 each: Kick Plate (corridor side of lower leaf).
- e. 1 each: Lockset Function F86 (lower leaf).
- f. 1 each: Pull (upper leaf).
- g. 1 each: Flush Bolt (upper leaf).
- h. 2 each: Stop (wall mounted each leaf).

#### **Double Interior Doors:**

#### Group 50:

- General: a.
  - 1) 1 set: Smoke Gaskets.
- b. Active Leaf:
  - 1) 3 each: Hinges.
  - 2) 1 each: Lockset Function F81.
  - 1 each: Stop (See Door Schedule for type).
- Inactive Leaf: C.
  - 2 each: Flush Bolts. 1)
  - 3 each: Hinges.
  - 1 each: Stop (See Door Schedule for type). 3)

## Group 50F:

- a. General:
  - 1) 1 set: Smoke Gaskets.
- Active Leaf: b.
  - 1) 1 each: Deadbolt, Function E2152.
  - 2) 3 each: Hinges.
  - 3) 1 each: Stop.
- C. Inactive Leaf:
  - 1) 1 each: Astragal (font side of door).
  - 2) 1 each: Dummy Latchset, (pull side only).
  - 1 each: Flush Bolt (top).
  - 3 each: Hinges. 4)

#### 3. Group 51:

- General: a.
  - 1) 1 set: Smoke Gaskets.
- Active Leaf: b.
  - 1) 3 each: Hinges.
  - 2) 1 each: Lockset Function F86.
  - 3) 1 each: Stop.
- Inactive Leaf:
  - 1) 1 each: Flush Bolt.
  - 2) 3 each: Hinges.
  - 3) 1 each: Stop.

## Group 52:

- General:
  - 1) 1 set: Smoke Gaskets.
- Active Leaf:
  - 1) 1 each: Closer with hold open function.
  - 3 each: Hinges. 2)
    - 1 each: Pull. 1 each: Push. 3)
    - 4)
    - 5) 1 each: Kick Plate.
    - 6) 1 each: Stop.

- c. Inactive Leaf:
  - 1) 1 each: Closer with hold open function.
  - 2) 3 each: Hinges.
  - 3) 1 each: Kick Plate.
  - 4) 1 each: Pull.
  - 5) 1 each: Push.
  - 6) 1 each: Stop.

#### PART 3 - KEYING SCHEDULE for FINISH HARDWARE

## 3.1 KEYING SCHEDULE

A. Stake Center Meetinghouse Keying Schedule:

1. General access Rooms and Font (Font Dressing Rooms if included):

Key	Stamped	Amount	Door Numbers of Doors Operated by Key
XAA1	GEN	45	116b, 160, 174c, 179a, 179b, 180 and 181.

a. All AA keys, except AA12, AA13 and XAA14 will open these doors.

#### 2. Bishop's Offices:

Key	Stamped	Amount	Doors Operated by Key	
AA2	BP 1	5	101. Key AA2 will also open XAA1, XAA5, and XAA12.	
AA3	BP 2	5	113. Key AA3 will also open XAA1, XAA6, and XAA12.	
AA4	BP 3	5	152. Key AA4 will also open XAA1, XAA7, and XAA12.	

#### 3. Clerk's Offices:

Key	Stamped	Amount	Doors Operated by Key
XAA5	CLK 1	5	107. Key AA5 will also open XAA1.
XAA6	CLK 2	5	110. Key AA6 will also open XAA1.
XAA7	CLK 3	5	151. Key AA7 will also open XAA1.

a. Keys to Bishop's Office will also open Clerk's Office, Bishop-1 to Clerk-1, etc.

4. Auxiliary Organization Storage Spaces (Storage Building):

Key	Stamped	Amount	Doors Operated by Key		
AA8	AUX 1	6	301. Key AA8 will also open XAA1.		
AA9	AUX 2	6	302. Key AA9 will also open XAA1.		
AA10	AUX 3	6	303. Key AA10 will also open XAA1.		
AA11	AUX 4	18	304. Key AA11 will also open XAA1.		

## 5. Material Center:

material ec	natorial Conton.						
Key	Stamped	Amount	Doors Operated by Key				
XAA12	MTL CTR	12	121. Key AA12 will also open XAA1.				

a. Keys to Bishop's will also open Material Center.

## 6. Mechanical And Utility Rooms:

Key	Stamped	Amount	
XAA13	MECH	2	137 and 166.

#### 7. Technology Room:

	261110106) 11001111					
k	<ey< th=""><th>Stamped</th><th>Amount</th><th></th></ey<>	Stamped	Amount			
XA	A14	TECH	5	103a and 103b.		

a. Keys to Bishop's Offices will open Technology Room.

## 8. Sports Closet:

Key	Stamped	Amount	
XAA15	SC	10	165.

a. Keys to Bishop's and Stake President's Offices will open Sports Closet.

9. Stake President's Office:

Key	Stamped	Amount	Doors Operated by Key
AA16	STK PR	5	140. Key AA16 will also open XAA1, XAA12, XAA15, and XAA17.

10. Remaining Stake Suite Doors (excluding Exterior Door):

Key	Stamped	Amount	Doors Operated by Key	
XAA17	STK	20	139a, 139b, 141, 143, and 145. Key AA17 will also open XAA1.	

a. Keys to Stake President's Office will open Stake Suite doors.

11. Provide interior keying system that includes Master Key and Change Key levels. Pin locks so pins in Master Keys are two numbers minimum different between Master Keys and associated change keys. Provide six AA Master Keys.

END OF SECTION

## SECTION 08 1213 HOLLOW METAL FRAMES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Hollow metal frames.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.
  - 2. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for aluminum entry frames.

#### 1.2 REFERENCES

- A. Reference Standards:
  - American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
    - AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
  - 2. ASTM International:
    - a. ASTM A568/A568M-13a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
    - b. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - 3. Steel Door Institute:
    - a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.
    - b. SDI A250.11-2012, 'Recommended Erection Instructions for Steel Frames'.

### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Copy of SDI A250.11.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

- A. Suppliers:
  - 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
    - a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
      - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
    - b. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
      - 1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.
- B. Manufacturers:
  - 1. Category One Approved Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Any current member of Steel Door Institute.

#### C. Frames:

- 1. Cold rolled furniture steel.
  - a. Interior Frames: 16 ga.
  - b. Exterior Frames: 14 ga.
- 2. Provide labeled frame to match fire rating of door.
- 3. Finish:
  - a. Use one of following systems:
    - 1) Prime surfaces with rust inhibiting primer.
    - 2) Galvanize.
- 4. Anchors: 16 US ga minimum meeting UL or other code acceptable requirements for door rating involved.

#### D. Fabrication:

- 1. General Requirements:
  - a. Frames shall be welded units. Provide temporary spreader on each welded frame.
  - b. Provide Manufacturer's gauge label for each item.
  - c. Make breaks, arises, and angles uniform, straight, and true. Accurately fit corners.
- 2. Frame width dimension:
  - a. Fabricate frame 1/8 inch wider than finished wall thickness as described in Contract Documents.
- 3. Provide mortar guards at strikes and hinges.
- 4. Anchors:
  - a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.
  - Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
  - c. Anchor types and configurations shall meet wall conditions.

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

HOLLOW METAL FRAMES - 2 - 08 1213

## SECTION 08 1313 HOLLOW METAL DOORS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Hollow metal doors.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for door installation.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. National Association of Architectural Metal Manufacturers (NAAMM):
    - a. HMMA 810-09, 'Hollow Metal Manual'.
    - b. HMMA 860-09, 'Hollow Metal Door and Frames'.
  - Steel Door Institute:
    - a. SDI-108, 'Recommended Selection and Usage Guide for Standard Steel Doors.
- B. Reference Standards:
  - American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
    - AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
  - ASTM International:
    - a. ASTM A568/A568M-15, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
    - b. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - c. ASTM C1036-16, 'Standard Specification for Flat Glass'.
    - d. ASTM C1048-12e, 'Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass'.
  - 3. Steel Door Institute:
    - a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

- A. Suppliers:
  - Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
    - a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
      - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
    - b. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
      - 1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.
- B. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Any current member of Steel Door Institute.

## C. Doors:

- 1. Meet one of following requirements:
  - a. Meet requirements of Steel Door Institute ANSI / SDI A250.8.
  - b. Commercial grade steel meeting requirements of ASTM A568/A568M, Class 1:
    - l) Grade I for interior doors, Grade II for exterior doors.
    - 2) Model 1 Full Flush or Model 2 Seamless designs at Manufacturer's option.
    - 3) Type F as required.
    - 4) Finish:
      - a) Exterior doors galvanized and primed as per ASTM A653/A653M.

#### D. Fabrication:

- General:
  - a. Mortise and reinforce doors for hinges and locks.
  - b. Reinforce doors for closers and other surface applied hardware.
  - c. Drill and tap on job.
  - d. Seams along vertical edges of door need not be filled.
  - e. Do not extend hinge cut out full width of door unless fill strip is inserted, weld filled, and ground smooth so no seam appears on back face plate.

### 2.2 SOURCE QUALITY CONTROL

#### A. Tests:

- 1. Verification of Performance:
  - a. Label each door as conforming to above required standards.

## PART 3 - EXECUTION: Not Used

END OF SECTION

HOLLOW METAL DOORS - 2 - 08 1313

# SECTION 08 1429 FLUSH WOOD DOORS: Factory-Finished, Clear

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Factory-finished flush wood doors.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.
  - 2. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets' for cabinet doors.
  - 3. Section 09 9324: 'Interior Clear-Finished Hardwood'.

#### 1.2 REFERENCES

- A. Abbreviations And Acronyms:
  - 1. AWS: Architectural Woodwork Standards (formerly AWI).
  - 2. FD: Fire-resistant core, fire-resistant materials assembled to stiles and rails according to methods prescribed by the testing agency to meet rigorous smoke, flame, and pressure tests.
  - 3. FD-5: Core with 2 layers on each side.
  - 4. ME: Matching edges, i.e., vertical edges same as decorative faces.
  - 5. PC: Particleboard core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.
  - 6. PC-5: Core with 2 layers on each side.

#### B. Association Publications:

- Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
  - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

#### C. Definitions:

- 1. Book-Match: Matching between adjacent veneer leaves on one panel face. Every other piece of veneer is turned over so that the adjacent leaves are "opened" as two pages in a book. The fibers of the wood, slanting in opposite directions in the adjacent leaves, create a characteristic light and dark effect when the surface is seen from an angle.
- 2. Fire-rated: Fire-retardant particleboard with an Underwriters' Laboratory (UL) stamp for Class 1 fire rating (Flame Spread 20, Smoke Developed 25). Fire-rated doors are available with particleboard and mineral cores for ratings up to 1-1/2 hours.
- 3. Fire-rated Door: A door made of fire-resistant material that can be closed to prevent the spread of fire and can be rated as resisting fire for 20 minutes (1/3 hour), 30 minutes (1/2 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified testing and inspection agency.
- 4. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
  - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
  - b. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.
- 5. Running Match: Each panel face is assembled from as many veneer leaves as necessary. Any portion left over from one panel may be used to start the next.

#### D. Reference Standards:

- American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
  - a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.

- 2. ASTM International:
  - a. ASTM C1036-16, 'Standard Specification for Flat Glass'.
  - ASTM C1048-12, 'Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass'.
- 3. Hardwood, Plywood, and Veneer Association:
  - a. HPVA HP-1-2009 'Standard for Hardwood and Decorative Plywood'.
- 4. National Particleboard Association / Composite Panel Association:
  - a. NPA A208.1-2009, 'Particleboard'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - Shop Drawings:
    - Schedule showing type of door at each location. Included shall be size, veneer, core type, fire rating, hardware prep, openings, blocking, etc.
    - b. Indicate factory finish color and type.
  - 2. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - 1) Approval subject to Annual Review:
        - a) Prepare sample to match Control Sample available from Owner to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
        - b) Approval of sample by Owner will establish performance standard of stain to be used until next annual review.
      - 2) Design Criteria:
        - a) Provide 8 inch by 10 inch sample of Red Oak to match stain Control Sample provided by Owner.
- B. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.
- C. Closeout Submittals:
  - 1. Include following information in Operations And Maintenance Manuals specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's product literature on doors and factory finish.
        - b) Maintenance and repair instructions.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver in clean truck and, in wet weather, under cover.
  - 2. Deliver to building site only after plaster, cement, and taping compound are completed and dry and after interior painting operations have been completed.
  - 3. Individually wrap in polyethylene bags for shipment and storage.
- B. Storage And Handling Requirements:
  - 1. Store doors in a space having controlled temperature and humidity range between 25 and 55 percent.
  - 2. Store flat on level surface in dry, well ventilated space.
  - 3. Cover to keep clean but allow air circulation.
  - 4. Do not subject doors to direct sunlight, abnormal heat, dryness, or humidity.
  - 5. Handle with clean gloves and do not drag doors across one another or across other surfaces.
  - 6. Leave shipping bag on door after installation until immediately before substantial completion inspection.
  - 7. Doors have been acclimated to the field conditions for a minimum of 72 hours before installation is commenced.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard full door warranty for lifetime of original installation.
    - a. Warranty shall include finishing, hanging, and installing hardware if manufacturing defect was discovered after door was finished and installed.
    - b. Warranty to include defects in materials including following:
      - 1) Delaminating in any degree.
      - 2) Warp or twist of 1/4 inch or more in door panel at time of one-year warranty inspection.
      - 3) Telegraphing of core assembly: Variation of 1/100 inch or more in 3 inch span.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

#### A. Suppliers:

- Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
  - a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
    - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
  - b. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
    - Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

#### B. Manufacturers:

- 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
  - a. Graham Wood Doors, Mason City, IA.
  - b. Marshfield Door Systems Inc, Marshfield, WI.
  - c. VT Industries, Holstein, IA.

## C. Wood Doors:

- 1. Type: AWS PC-5ME or FD-5ME.
- 2. Grade: AWS Premium, except face veneer.
- 3. Fully Type I Construction: Adhere all glue lines with Type I adhesive, including veneer lay-up.
- 4 Face Veneer:
  - a. Plain sliced Red Oak meeting requirements of AWS Grade A, 1/50 inch thick minimum immediately before finishing.
  - b. Face veneers shall be running book matched.
- 5. Core:
  - a. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
  - b. Non-Rated:
    - 32 Ib density meeting requirements of ANSI A208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
    - 2) Stiles:
      - a) 1-3/8 inches deep minimum before fitting.
      - b) Stile face to be hardwood matching face veneer material, thickness manufacturer's standard.
    - 3) Rails:
      - a) 1-1/8 inches.
      - b) Manufacturer's option.
- 6. Factory Glazing (non-fire-rated openings):
  - a. Glazing: Tempered glazing meeting requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality q3. Thickness 1/4 inch.
  - b. Lite Kit:
    - 1) Design Criteria:
      - a) Pre-finished wood or wood veneer frames.
    - 2) Dimensions:
      - a) Meetinghouse Classroom Doors: 6 inch wide by 16 inches high cutout opening) security view window with bottom of opening located 56 inches above finish floor and side located 6 inches from strike edge of door.

- 3) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
  - a) Profile M6G by Graham.
  - b) Profile W6 by Marshfield.
  - c) Profile VT1 by VT Industries.

#### D. Fabrication:

- 1. Doors shall be factory-machined. Coordinate with Section 08 1213 and Sections under 08 7000.
- E. Finishes:
  - 1. Factory Finishing:
    - a. Applied by Door Manufacturer before leaving factory.
    - b. Performance / Design Criteria:
      - 1) Finish factory-finish to match Owner selected sample as specified in Section 09 9324.
      - 2) Color:
        - a) LDS Cherry.
    - c. Finish: AWS Finish System TR-6 Catalyzed Polyurethane Premium Grade for unfilled, open-grain woods.

## 2.2 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Verification of Performance:
    - a. Doors shall have following information permanently affixed on top of door:
      - 1) Manufacturer:
      - 2) Door designation or model.
      - 3) Veneer species.
      - 4) Factory finish.
  - 2. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

## SECTION 08 3110 ACCESS DOORS AND PANELS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Manufactured access doors.
- B. Related Requirements:
  - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Acceptable Manufacturers:
  - 1. Babcock-Davis, Minneapolis, MN www.babcock-davis.com.
  - 2. The Bilco Company, New Haven, CT www.bilco.com or Bilco Canada, London, ON (519) 659-7331.
  - 3. Dur-Red Products, Cudahy, CA www.dur-red.com.
  - 4. Elmdor Stoneman, City of Industry, CA www.elmdorstoneman.com.
  - 5. Jensen Industries, Los Angeles, CA www.jensen-ind.com.
  - 6. Karp Associates Inc, Maspeth, NY www.karpinc.com.
  - 7. Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
  - 8. Mifab Manufacturing Co, Minneapolis, MN www.mifab.com.
  - 9. Milcor, Bensenville, IL www.milcorinc.com.
  - 10. Nystrom Inc, Brooklyn Park, MN www.nystrom.com.
  - 11. Williams Brothers Corporation of America, Reno, NV www.wbdoors.com.
  - 12. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Standard Ceiling Access Doors:
  - 1. Manually operated with single key operated lock, interior latch release, and continuous piano hinge hardware.
  - 2. Factory powder-coated prime finish.
  - 3. Non-Fire-Rated, Class Two Quality Standards:
    - a. Drywall: KDW or Sesame (KSTDW or KSTE) by Karp.

#### PART 3 - EXECUTION: Not Used

# END OF SECTION

# SECTION 08 4113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install aluminum storefront entry and window systems, including hardware, glazing, and caulking, as described in Contract Documents and including the following:
    - a. Low energy swinging operators for ADA compliance.

#### B. Related Requirements:

- Section 01 1100: 'Summary Of Work' for cores for High Security Cylinders are excluded from Contract and provided by Owner. This specification establishes quality of materials and installation of those items for information of Contractor, Architect, and Owner's Representatives.
- 2. Section 06 1100: 'Wood Framing':
  - a. Pre-installation conference held jointly with Section 08 4113.
- 3. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
- 4. Section 08 8100: 'Glass Glazing' for quality of glass glazing.
- 5. Section 28 1316: 'Access Control System':
  - a. Coordination and location of pull string inside storefront door mullion for electric strike and proximity reader.
- 6. Division 26: 'Electrical' for power source, raceway, boxes, wiring for controls and operator.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. American Architectural Manufacturers Association (AAMA):
    - a. AAMA SFM 1-14, 'Aluminum Store Front and Entrance Manual'.
    - b. AAMA 501-15, 'Methods of Test for Exterior Walls'.
    - c. AAMA 609 & 610-15, 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined documents).
    - d. AAMA 2605-17, 'Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels'.

## B. Definitions:

- 1. Glass Surface:
  - a. Insulated glass unit:
    - 1) Surface 1: Exterior surface of outer lite.
    - 2) Surface 2: Interspace-facing surface of outer lite.
    - 3) Surface 3: Interspace-facing surface of inner lite.
    - 4) Surface 4: Interior surface of inner lite.
  - b. Monolithic glass:
    - 1) Surface 1: Exterior surface.
    - 2) Surface 2: Interior surface.

### C. Reference Standards:

- 1. American National Standards Institute / Builders Hardware Manufacturers Association:
  - a. ANSI/BHMA A156.19-2013, 'Power Assist & Low Energy Operated Doors'.
- 2. ASTM International:
  - a. ASTM B221-14, 'Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes'.
  - b. ASTM B456-17, 'Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium'.
  - c. ASTM B633-15, 'Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel'.
  - d. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
  - e. ASTM C1184-14, 'Standard Specification for Structural Silicone Sealants'.

- f. ASTM E283-04(2012), 'Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen'.
- g. ASTM E330/E330M-14, 'Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference'.
- h. ASTM E331-00(2016), 'Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference'.
- 3. International Building Code (IBC) (2015 or most recent edition adopted by AHJ):
  - a. Chapter 10, 'Means of Egress'.
  - b. Chapter 16, 'Structural Design'.
    - 1) Section 1609 'Wind Loads'.
- 4. International Code Council / American National Standards Institute:
  - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
- 5. National Fenestration Rating Council (NFNC):
  - a. NFRC 100-2014, 'Procedure for Determining Fenestration Product U-factors'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 06 1100.
    - a. Schedule pre-installation conference one (1) week before scheduled installation of storefront system.
    - b. In addition to requirements of Section 01 3100, review following:
      - 1) Review rough opening requirements:
        - a) Make certain rough openings are within tolerances required for installation of factory-fabricated frames.
        - b) These dimensions have been agreed upon between Owner and Manufacturer and are shown on Standard Plan Drawings.
      - 2) Review installation scheduling, coordination, placement of doors.
      - 3) Review low-energy door operator location and requirements.
      - 4) Review delivery, storage, and handling requirements.
      - 5) Review 'Examination' requirements before sliding door installation.
      - 6) Review 'Finish' door and hardware requirements.
      - 7) Review 'Protection' responsibilities.
      - 8) Review 'Cleaning' responsibilities.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature.
      - 1) Storefront entry system.
      - 2) Low-energy door operator.
    - b. Color and finish.
  - Shop Drawings:
    - a. Clearly mark components to identify their location in Project.
    - b. Show exact dimensions of factory-fabricated frames and required tolerances for rough openings. Submit shop drawings in time for Pre-Installation Conference specified in Section 06 1100.
    - c. Show locations, sizes, etc, of hardware reinforcing.
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance, adjustment, and repair instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
        - a) Storefront warranty.

- b) Storefront closers.
- c) Low-energy door operator.
- c. Record Documentation:
  - 1) Manufacturers documentation:
    - a) Manufacturer's literature or cut sheets for storefront system and for each item of hardware.
    - b) Manufacturer's literature of cut sheets for low-energy door operators.
    - c) Color and finish selections.
    - d) Parts lists.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Storefront System Performance Requirements:
    - a. Provide test reports from AAMA accredited laboratories certifying performances if requested:
      - 1) Air Leakage: Meet requirements of ASTM E283.
      - 2) Limit air leakage through assembly to 0.06 CFM/min/sq ft of wall area at 6.24 PSF as measured in accordance with ASTM E283.
      - 3) Water Resistance: No water leakage when measured in accordance with ASTM E331 with static test pressure of 8PSF as defined by AAMA 501.
      - 4) Dynamic Water Resistance: No water leakage, when measured in accordance with AAMA 501 with dynamic test pressure of 8 PSF.
      - 5) Limit mullion wind load deflection of L/175 with full recovery of glazing materials, when measured in accordance with ASTM E330/E330M.
      - 6) System shall not deflect more than 1/8 inch at center point, or 1/16 inch at enter point of horizontal member, once dead load points have been established.
      - 7) System shall accommodate expansion and contraction movement due to surface temperature differential of 180 deg F.
      - 8) Seismic testing shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Manufacturer Qualifications:
    - a. Provide aluminum entrances and storefront systems produced by firm experienced in manufacturing systems that are similar to those indicated for this project and have record of successful in-service performance.
  - 2. Fabricator Qualifications:
    - a. Provide aluminum entrances and storefront systems fabricated by a firm experienced in producing systems that are similar to those indicated for this Project and have record of successful in-service performance.
    - b. Fabricator shall have sufficient production capacity to produce components required without causing delay in progress of the Work.
  - 3. Installer Qualifications:
    - a. Minimum three (3) years' experience in storefront installations.
    - b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
    - c. Upon request, submit documentation.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver all parts of door, together with hardware, in original, unopened packages with labels intact to Project at same time.
- B. Storage And Handling Requirements:
  - 1. Store in clean, dry location, indoors in Manufacturer's unopened packaging until ready for installation and in accordance with Manufacturer's instructions.
  - 2. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.
  - 3. Protect materials and finish from damage during storage, handling and installation.

#### 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Storefront Entrances:
    - a. Manufacturer's Warranty to be free of defects in material and workmanship.
    - b. Manufacturer's Warranty against deterioration or fading.
    - c. Manufacturer's Lifetime Warranty for Door Construction for normal use.
  - Closers:
    - a. Closer Manufacturer's standard warranty, 10 years minimum.
  - 3. Low-Energy Door Operator:
    - a. Manufacturer's standard warranty.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

A. Manufacturers:

b.

- 1. Category One VMR Approved Manufacturers. See Section 01 6200 for definitions of Categories:
  - a. Arcadia Inc., Vernon CA www.arcadiainc.com.
    - 1) Contact Information: Ken Martinek, (602) 734-5327 kmartinek@arcadiainc.com.
    - Kawneer North America, Norcross, GA, www.kawneer.com/kawneer/north\_america.
      - 1) Contact Information: Bart Daniels cell (385) 214-4650 bart.daniels@alcoa.com.
- B. General:
  - 1. In addition to requirements shown or specified, comply with:
    - a. Applicable provisions of AAMA SFM 1, 'Aluminum Store Front and Entrance Manual' for design, materials, fabrication and installation of component parts.
- C. Design Criteria:
  - 1. Storefront System suitable for outside or inside glazing.
- D. Materials:
  - 1. Framing Components and Accessories:
    - a. Aluminum Extrusions:
      - 1) 6063-T6 aluminum alloy or meet requirements of ASTM B221, alloy GS 10a T6.
      - 2) Anchors, Clips, and Accessories:
        - a) Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated (properly isolated steel from aluminum).
      - 3) Fasteners:
        - Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
      - 4) Glazing Gasket:
        - a) Compression-type design with replaceable extruded EPDM rubber.
      - 5) Reinforcing Members:
        - Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
        - b) Mullion:
        - (1) Steel reinforced or heavy duty as necessary to prevent lateral flexing of mullion.
      - 6) Sills:
        - a) Match height of door bottoms.
      - 7) Sealant:
        - a) Structural Sealant meeting requirements of ASTM C1184 for fabrication within storefront system:
          - (1) Permanently elastic, non-shrinking, and non-migrating type for joint size and movement.
          - (2) Single-component neutral-curing silicone formulation compatible with system components specifically formulated and tested for use as structural sealant and approved by structuralsealant manufacturer for use in aluminum-framed systems indicated.
          - (3) Color: Black.

- Joint Sealants used at perimeter of storefront framing system: Elastomeric Sealant as specified in Section 07 9213.
- Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when required by local codes or AHJ.
- 8) Tolerances:
  - Tolerances for wall thickness and other cross-sectional dimensions of storefront members in compliance with AA Aluminum Standards and Data.
- b. Storefront Framing System:
  - Brackets and Reinforcements:
    - Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
  - 2) Fasteners and Accessories:
    - a) Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
  - 3) Perimeter Anchors:
    - a) When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- c. Finish:
  - 1) Match doors.
- d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - l) Non-Thermal, 2 inch Sightline:
    - a) Double Stack header at exterior doors where shown on Contract Drawings.
    - b) Single Glazed:
      - (1) AR450 by Arcadia.
      - (2) Trifab VG 450 by Kawneer.
    - c) Double Glazed:
      - (1) AG451 by Arcadia.
      - (2) Trifab VG 451 by Kawneer.
- 2. Manually Operated Doors:
  - a. Aluminum:
    - 1) 6063-T6 aluminum alloy or meet requirements of ASTM B221, alloy GS 10a T6.
  - b. Stiles:
    - 1) 3-1/2 inches by 1-3/4 inches by 0.125 inches thick nominal.
  - c. Top Rails:
    - 1) 3-1/2 inches minimum by 1-3/4 inches by 0.125 inches thick nominal. Bottom Rails:
  - d. Bottom Rails
    - 1) 10 inches minimum by 1-3/4 inches by 0.125 inches thick nominal.
  - e. Construction:
    - 1) Manufacturer's standard.
  - f. Glazing Stops:
    - 1) Snap-in type with neoprene bulb-type glazing. Units shall be glazed from exterior side.
  - g. Weatherstripping:
    - 1) Neoprene bulb-type.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Peri-Plus Seal (PPS) by Arcadia.
      - b) Sealair by Kawneer.
  - h. Framing System Gaskets and Sealants:
    - 1) Manufacturer's standard, recommended by manufacturer for joint type:
    - 2) Sealants: As specified in Framing Components and Accessories.
  - i. Factory Finishing:
    - 1) Fluorocarbon Carbon: comply with AAMA 2605:
      - a) Polyvinyledene Fluoride (PVDF) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum (PVDF) in resin portion of formula and providing pencil hardness of 3H. Thermo-cured two-coat system consisting of corrosion inhibiting epoxy primer and topcoat factory-applied over properly pre-treated metal.
      - b) Approved Colors:
        - (1) Classic Bone White by Arcadia.
        - (2) Bone White by Kawneer.
      - c) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
        - (1) BASF.
        - (2) PPG Industries, Inc.
        - (3) Valspar Corporation.

- j. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Non-Thermal:
    - a) MS362 Medium Stile by Arcadia.
    - b) 350 Medium Stile by Kawneer.
- 3. Glazing:
  - Glazing as specified in Section 08 8100: 'Glass Glazing'.
  - b. Glazing Gaskets:
    - 1) Compression-type design with replaceable extruded EPDM rubber.
  - Spacers and Setting Blocks: Elastomeric.
  - d. Bond-Breaker (Sealer) Tape: Standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
  - e. Glazing Sealant:
    - 1) Structural Sealant meeting requirements of ASTM C1184:
      - a) Permanently elastic, non-shrinking, and non-migrating type for joint size and movement.
      - b) Single-component neutral-curing silicone formulation compatible with system components specifically formulated and tested for use as structural sealant and approved by structuralsealant manufacturer for use in aluminum-framed systems indicated.
      - c) Color: Black.
    - 2) Weather Sealant:
      - a) ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weather seal sealant, and aluminum-framed-system manufacturers for this use.
      - b) Color: Match structural sealant.
    - 3) Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when required by local codes or AHJ.
- 4. Hardware:
  - a. Hinging:
    - 1) Top and bottom offset, ball bearing pivots per door leaf.
  - b. Overhead Door Closers:
    - 1) Provide parallel arms on closers unless door position requires otherwise.
    - Where possible, closers shall allow for 180 degree opening and not be used as stop. Provide Cush-N-Stop or equivalent arm where wall stop cannot be used.
    - 3) Adjust closers to provide maximum opening force as required by governing code authority.
    - 4) Closers shall have following features:
      - a) Adjustable sweep speed.
      - b) Adjustable backcheck.
      - c) Non-handed, non-sized.
      - d) Cush arm by LCN or equal by Norton.
    - 5) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - a) Surface mounted:
      - b) 4041 Series parallel arm by LCN.
      - c) 7500 Series Parallel arm by Norton.
  - Exit Devices:
    - 1) Entry Doors:
      - a) Operation:
        - Entry shall be by key. Device shall be locked by cylinder from outside. Key shall be removable when cylinder is in locked or unlocked position.
        - (2) Dogging operation shall be by manufacturer's accessible thumbturn cylinder function.
        - (3) Exterior Trim: Lever Handle or Pull equal to Kawneer CO-9 or Arcadia OPR-9.
        - (4) Types: Rim Type. Provide type of strike that will allow installation of specified panic devices on storefront system specified.
    - 2) Access Doors:
      - a) Operation:
        - (1) Access accomplished by dogging device. Dogging operation shall be by accessible, permanent knob, not by removable allen wrench devices.
        - (2) Exterior Trim: Match Entry Doors.
        - (3) Types: Rim Type. Provide type of strike that will allow installation of specified panic devices on storefront system specified.
    - 3) Emergency Egress Exit Doors:
      - a) Operation:
        - (1) Exit only with no dogging.
        - (2) Exterior Trim: None.

- (3) Type: Rim Type with type of strike that will allow installation of specified panic devices on storefront system specified.
- 4) Color:
  - a) Equivalent to clear anodized.
- 5) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) Apex Series by Precision.
  - ) 80 Series by Sargent.
  - c) 98 or 99 Rim Series by Von Duprin.
- d. Low-Energy Swing Door Operator:
  - 1) Meet requirements of ICC/ANSI 117.1 and BHMA A156.19.
  - 2) Wall-mounted push button operation.
  - 3) Solid state electronic control.
  - 4) Adjustable closing speed and hold-open range.
  - 5) Automatic and manual operating modes.
  - 6) Metal cover finished to match door.
  - 7) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - Besam SW100 by Besam (subsidiary of ASSA ABLOY) US-Monroe, NC www.besam.us.
    - b) Horton Series 7100 Low Energy by Horton Automatics (Division of Overhead Door Corp.), Corpus Christi, TX www.hortondoors.com.
    - Record 6100 Series Low Energy Swing Door Operator by Record-USA, Monroe, NC www.record-usa.com.
    - d) Stanley Magic-Force by Stanley Access Technologies, Farmington, CT www.stanleyaccesstechnologies.com.
- e. Thresholds:
  - 1) Exterior:
    - a) Design Criteria: Meet handicap accessibility requirements.
    - Exterior to Paver Tile on Setting Bed: Manufacturer's standard.
    - c) Exterior to Thin-Set Paver Tile: Similar to Pemko 253, 254, or 255 Profile.
    - d) Exterior to Carpet Tile: Similar to Pemko 273 Profile.
  - 2) Interior:
    - a) Design Criteria: Meet handicap accessibility requirements.
    - b) Carpet Tile / Carpet to Carpet: Similar to Pemko 236.
- f. Sweep Strips:
  - 1) Class Two Quality Standard:
    - a) Entrance Manufacturer's standard (cover cap with no exposed fasteners).
    - b) Pemko 293100 N8.
- g. Push / Pulls:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) PBR and OPR-9 by Arcadia.
    - b) Kawneer CP and CO-9, clear anodized.
- h. High Security Cylinders And Cores:
  - 1) Schlage cores with Everest keying system with special Church side bit milling:
    - a) Church And Factory Authorized USA Distributors:
      - Architectural Building Supply, P O Box 65678, Salt Lake City, UT 84165-0678 or 2965 South Main St, Salt Lake City, UT 84115.
        - (a) (801) 486-3481.
        - (b) FAX: (801) 484-6817.
- i. Kick Plates:
  - 1) Push side of Door only.
  - 2) 10 inches high by width of door less 3/4 inch on each side.
  - 3) Material: 0.050 inch thick Stainless Steel.
  - 4) Type Two Acceptable Manufacturers:
    - a) Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
    - b) Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 www.hagerhinge.com.
    - c) Ives, Wallingford, CT www.iveshardware.com.
    - d) Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
    - e) Equal as approved by Architect before bidding. See Section 01 6200.

## E. Fabrication:

- 1. Construction shall meet Manufacturer's recommendations.
- 2. Fabricate components that, when assembled, have following characteristics:
  - a. Profiles sharp, straight, and free of defects or deformations.

- b. Accurately fit joints; make joints flush, hairline and weatherproof.
- c. Means to drain water passing joints, condensation within framing members, and moisture migrating within system to exterior.
- d. Physical and thermal isolation of glazing from framing members.
- e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
- f. Provisions for field replacement of glazing.
- g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- h. Framing members shall be internally reinforced and secured at head and sill as necessary for structural performance requirements and for hardware attachment.
- 3. Fabricate in factory to dimensions required to fit framed openings detailed on Contract Documents. Joints shall be tightly closed.
- 4. Mortise in manner to give maximum hardware-door connection strength and neatness of appearance. Adequately reinforce with back plates or rivnuts to hold pivots and closers.
- 5. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- 6. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- 7. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
- 8. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

#### F. Hardware Finishes:

- 1. Finishes for steel, brass, or bronze hardware items shall be satin chromium plated.
- 2. Materials other than steel, brass, or bronze shall be finished to match the appearance of satin chromium plated.

#### PART 3 - EXECUTION

#### 3.1 INSTALLERS

- A. Performance Standard Installers: See Section 01 6200 for definitions of Categories. See Section 01 4301 and 'Quality Assurance' in Part 1 'General' for Installer Qualifications of this specification:
  - 1. General Contractor responsible for Installer(s), verification of qualifications, and performance. Contact VMR Approved Manufacturer's Representative specified in Part 2 'Products' of this specification for potential installers if desired.

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - Verify that framed openings will accommodate factory-fabricated storefront entry and window frames of dimensions agreed upon by Owner and Manufacturer and shown on Standard Plan documents.
  - 2. Verify floor is level across entire width of automatic door opening.
  - 3. Verify sill conditions are level and/or sloped away from openings as specified.
  - 4. Verify wall framing is dry, clean, sound, and free of voids and offsets, construction debris, sharp edges or anything that will prevent a successful installation of storefront system.
  - 5. Notify Architect and Owner in writing if framed openings are not as agreed upon.
    - Do not install storefront entry and window frames until deficiencies in framed openings have been corrected to allow installation of standard entries and windows.
    - b. Commencement of Work by installer is considered acceptance of substrate.

## 3.3 INSTALLATION

### A General

- 1. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- 2. All installation shall be in accordance with manufacturer's published recommendations and in accordance with approved shop drawings.
- 3. Do not install damaged components. Fit frame joints tight, free of burrs and distortion. Rigidly secure non-movement joints.

- 4. Isolate metal surfaces in contact with incompatible metal or corrosive substrates, including wood, by applying sealer tape to prevent electrolytic action.
- B. Set plumb, square, level, and in correct alignment and securely anchor to following tolerances:
  - 1. Variation from plane: Limit to 1/8 inch in 12 feet; 1/4 inch over total length.
  - 2. Offset from Alignment: For surfaces abutting in line, limit offset to 1/16 inch.
  - 3. Offset at Corners: For surfaces meeting at corner, limit offset to 1/32 inch.
  - 4. Diagonal measurements: Limit difference between diagonal measurements to 1/8 inch.
  - 5. Sidelites: Line up horizontal rail in sidelight with door rail.
- C. Install doors without warp or rack. Adjust doors and hardware to provide ninety (90) degree operation, tight fit at contact points and smooth operation.
- D. Install exterior window units with through wall sill flashing.
- E. Thresholds:
  - 1. Accurately cut thresholds to fit profile of storefront frame. Bed exterior thresholds in specified sealant at contact points with floor and make watertight.
- F. Sealants:
  - 1. Apply in accordance with Section 07 9213 'Elastomeric Joint Sealant' requirements.
  - 2. Caulk joints between frames and walls, both interior and exterior to provide weather tight installation.
- G. Glazing Characteristics:
  - 1. Interior Vestibule Glazing: Clear.
  - 2. Exterior Storefront Doors And Sidelights Opening Into Foyers And Corridors:
    - a. Clear interior pane and Clear exterior pane with Low E treatment on surface 2.
  - 3. All Other Exterior Storefront Doors And Storefront:
    - a. Obscure interior pane with pattern on surface 3 and Clear exterior pane with Low E treatment on surface 2.

## 3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Pull test doors, especially pairs of single doors separated by permanent mullions, to ensure security of opening.
  - 2. Make all necessary final adjustments to attain normal operation of each door and its mechanical hardware.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements including removal and replacement of glass that has been broken, chipped, cracked, abraded, or damaged during construction period at no additional cost to the Owner.

## 3.5 ADJUSTING

A. Adjust swing doors for proper operation after glazing entry. After repeated operation of completed installation, re-adjust door for optimum operating condition and safety if required.

#### 3.6 PROTECTION

- A. During Installation:
  - 1. Installer's Responsibility:
    - a. During installation, all adjacent work shall be protected from damage.
- B. After Installation:
  - 1. General Contractor's Responsibility:
    - a. Institute protective measures required throughout remainder of construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

## 3.7 CLEANING

#### A. General:

- 1. Installer's Responsibility:
  - Follow Manufacturer's written recommendations for cleaning and maintenance or guidelines of AAMA 609
     & 610 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined documents).
     Avoid damaging protective coatings and finishes.
  - b. Clean glass and aluminum surfaces, inside and out, promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Exercise care to avoid damage to coatings.
  - c. Remove nonpermanent labels, protective films, and clean surfaces following recommended procedures.
    - 1) Do NOT remove permanent AAMA/CSA or NFRC labels.

## B. Waste Management:

1. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

## SECTION 08 5313 VINYL WINDOWS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Window units.
- B. Related Requirements:
  - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealant and backer rod.
  - 3. Section 08 4113: 'Aluminum-Framed Entrances And Storefront' for fixed storefront windows.
  - 4. Section 08 8100: 'Glass Glazing' for quality of glass glazing.

#### 1.2 REFERENCES

#### A. Association Publications:

- 1. American Architectural Manufacturers Association:
  - a. AAMA 701/702-11, 'Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals'
  - b. AAMA 711-13, Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.
  - c. AAMA 851-09, 'Fenestration Sealants Guide for Windows, Window Walls and Curtain Walls'.
  - d. AAMA 902-14, 'Voluntary Specification for Sash Balances',
  - e. AAMA 910-09, 'Life Cycle Specifications and Test Methods for AW Class Architectural Windows and Doors'.
  - f. AAMA 1503-09, 'Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections'.
  - g. AAMA 2605-13, 'Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Plastic Profiles'.
- 2. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
  - AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
- 3. Fenestration Manufacturers Association / American Architectural Manufacturers Association:
  - a. FMA/AAMA100-12, 'Standard Practice for the Installation of Windows with Flanges or Mounting Fins in Wood Frame Construction'.
- 4. National Fenestration Rating Council, Silver Spring, MD:
  - a. NFRC Certification Program.
  - b. NFRC 200-2009, Section 5.6 (Non-Residential Fenestration).

#### B. Definitions:

- 1. Air Leakage: Flow of air which passes through fenestration products.
- 2. Fenestration: Openings in or on the building envelope, such as windows, doors, secondary storm products (SSPs) curtain walls, storefronts, roof windows, tubular daylighting devices (TDDs), sloped glazing, and skylights, designed to permit the passage of air, light, or people.
- 3. Obscure Glass: Adds privacy where window coverings are impractical or undesirable. Various colors and texture patterns provide translucent or semi-opaque effect. May be tempered for use where safety glass is required.
- 4. Water Penetration: Measurement of the resistance of a fenestration product to the passage of water.

## C. Reference Standards:

- ASTM International:
  - a. ASTM E90-09(2016), 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements'.
  - b. ASTM E330-14, 'Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference'.
  - c. ASTM E2112-07(2016), 'Standard Practice for Installation of Exterior Windows, Doors and Skylights'.

 ASTM F588-14, 'Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference.
  - 2. Schedule conference before scheduled installation of vinyl windows.
  - 3. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review Installation scheduling, coordination, and placement of windows.
    - b. Review Manufacturer's installation requirements to assure issuance of Manufacturer's warranty.
    - c. Before installing windows, review Manufacturer's submitted installation requirements and install first window, including flashing and sealant, to demonstrate standard for installation of remaining windows.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet.
    - b. Literature on glazing.
    - c. Color selection.
    - d. Window U and SHGC Factors, written certificate from window manufacture.
  - 2. Shop Drawings: Submit before beginning framing. Show rough opening requirements.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Manufacturer's published installation instructions for windows, flashing, and sealants.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include copy of final, executed warranty.

## 1.5 QUALITY ASSURANCE

- A. Certifications:
  - 1. Confirmation of ICC report for flashing.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Examine and report damaged materials to Architect and/or Owner immediately.
- B. Storage And Handling Requirements:
  - 1. Provide secure location protected from the weather and other trades.
  - 2. Store window units in an upright position in clean and dry storage area above ground and protect from weather.

## 1.7 WARRANTY

- A. Special Warranty:
  - 1. Provide written non-prorated Manufacturer's warranty including:
    - a. Ten (10) years for glass, parts and labor.

VINYL WINDOWS - 2 - 08 5313

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

- A. Category Four Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. Montecito Window by Milgard Manufacturing Inc, Tacoma, WA www.milgard.com.
    - a. Contact Information:
      - General Information: 1010 54th Ave East, Tacoma, WA 98424 Phone (253) 922-2030, www.milgard.com.
      - 2) Primary Contact: Jeff Mead, cell (801 597-2664 jeffmead@milgard.com.
      - 3) Inside Sales, (800) 777-7714 Candice Willis, candicewilles@milgard.com.
- B. Manufactured Window Units:
  - Fixed Window:
    - a. Montecito Picture:
      - 1) Model: 8320M.
- C. Design Criteria:
  - Performance:
    - Comply with minimum test requirements of AAMA / WDMA / CSA 101 for classification of specified window in following:
      - 1) Air infiltration.
      - 2) Water Resistance.
      - 3) Wind Load Resistance.
      - 4) Condensation Resistance.
      - 5) Uniform structural load.
    - AAMA / WDMA / CSA 101 classification C30 minimum for windows, tested at 4 feet wide by 7 feet high minimum.
    - c. Meet following thermal performance:
      - 1) Condensation Resistance Factor (CRF) of 48 minimum when tested in accordance with AAMA 1503.
      - 2) Thermal Transmittance of 0.65 maximum when tested in accordance with AAMA 1503.
- D. Manufactured Units:
  - Windows:
    - a. Factory glazed.
    - b. Weatherstripped.
    - c. Flanged for installation in framed buildings; Non-flanged for installation in masonry buildings. Installation method shall not require drilling into frame.
    - d. Approved Color:
      - 1) White.
    - e. Muntin Pattern:
      - 1) Determined by building style selection.
- E. Fabrication:
  - 1. Corners shall be thermally fused.
- F. Glazing Requirements:
  - 1. Glazing Characteristics:
    - a. Obscure interior pane with pattern on surface 3 and Clear exterior pane with Milgard SunCoatMax 366 Low-E treatment on surface 2.
  - 2. Glazing Beads: Manufacturer's standard.

## 2.2 ACCESSORIES

- A. Anchoring Devices:
  - 1. Aluminum or stainless steel.
  - 2. Other corrosion-resistant or insulated anchors as specifically approved by Architect in writing before use.

#### B. Flashing:

- 1. Self-adhesive rubberized asphalt with protective sheet.
- 2. Type Two Acceptable Products:
  - a. Flexwrap by duPont Tyvek, Wilmington, DE www.tyvek.com.
  - b. Eternabond, Mundelein, IL www.eternabond.com.
  - c. FortiFlash 20 mil by Fortifiber, Reno, NV www.fortifiber.com.
  - Vycor Self-Adhered Flashing by Grace Construction Products, Cambridge, MA www.na.graceconstruction.com.
  - e. Optiflash B-20 by Covalence Coated Products, Homer, LA www.covalencecoatedproducts.com.
  - f. BT25XL Window Sealing Tape by Protecto Wrap, Denver, CO www.protectowrap.com.
  - g. Rufco-Shield Window & Door Flashing by Raven Industries, Sioux Falls, SD www.ravenind.com.
  - h. Equal as approved by Architect before installation. See Section 01 6200.

## 2.3 SOURCE QUALITY CONTROL

- A. Identification:
  - When delivered to Project site, windows shall bear permanent label stating model of window and Manufacturer's name, or AAMA label.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Evaluation And Assessment:
  - Openings:
    - a. Examine openings for adequacy in allowing successful installation and operation.
    - b. Verify openings are prepared to specified dimensions and are plumb and level.
  - 2. Notify Architect in writing of inadequate conditions.
    - a. Do not install windows until conditions have been corrected.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

## 3.2 INSTALLATION

- A. Set window frame plumb, level, and in alignment. Secure window properly in opening.
- B. Apply specified sealant between window frame and building wall as specified in Section 07 9213.
- C. Apply flashing.

## 3.3 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. After installation of windows and before installation of exterior wall finish, inspect windows and compare to installation standard accepted at Pre-Installation Conference.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

## 3.4 CLEANING

A. After installation, clean interior and exterior surfaces of windows and accessories of mortar, plaster, paint, and other contaminants. Maintain protection and provide final cleaning.

#### END OF SECTION

VINYL WINDOWS - 4 - 08 5313

# SECTION 08 7101 COMMON FINISH HARDWARE REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. General requirements for finish hardware related to architectural wood and hollow metal doors.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation of hardware.
  - 2. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets' for architectural woodwork hardware.
  - 3. Section 08 0601: 'Hardware Group and Keying Schedules'.
  - 4. Section 08 4113: 'Aluminum-Framed Entrances and Storefronts' for storefront hardware.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 15th Floor, New York, NY 10017-6603, Tel: 212-297-2122 Fax: 212-370-9047, www.buildershardware.com.
- B. Reference Standards:
  - 1. International Code Council / American National Standards Institute:
    - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
  - 2. Underwriters Laboratories (UL):
    - a. UL 10B, 'Fire Tests of Door Assemblies'.
    - UL 10C. 'Positive Pressure Fire Tests of Door Assemblies'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Hardware Templates:
    - a. Provide hardware templates to Sections 08 1213, 08 1313, and 08 1429 within fourteen (14) days after Architect approves hardware schedule.
    - b. Supply necessary hardware installation templates to Section 06 2024 before pre-installation conference.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's cut sheets.
    - b. Two (2) copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one (1) set in 'Operations And Maintenance Manual' and send one (1) set with hardware when delivered.
    - c. Copy of hardware schedule.
    - d. Written copy of keying system explanation.
  - 2. Shop Drawings:
    - a. Submit hardware schedule indicating hardware to be supplied.
    - b. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.

- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - Manufacturer's literature and/or cut sheets.
        - b) Include keying plan and bitting schedule.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule.
  - 2. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

#### PART 2 - PRODUCTS

### 2.1 SUPPLIERS

- A. Category One VMR Approved Suppliers. See Section 01 6200 for definitions of Categories:
  - 1. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
    - a. Contact Information: Russ Farley, phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
  - 2. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
    - Contact Information: Jared Butler, phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

### 2.2 FINISHES

- A. Hardware Finishes:
  - 1. Finishes for brass or bronze hardware items shall be:
    - a. ANSI / BHMA Finish Code 626.
      - 1) Description: Satin Chromium Plated.
      - 2) Base Metal: Brass. Bronze.
  - 2. Finishes for flat goods items may be:
    - ANSI / BHMA Finish Code 630.
      - 1) Description: Satin Stainless Steel.
      - 2) Base Metal: Stainless Steel (300 Series).
  - 3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

#### 2.3 FASTENERS

A. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware. Fasteners shall be of same material and finish as hardware unless otherwise specified. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.

#### PART 3 - EXECUTION

### 3.1 PREPARATION

A. Before ordering materials, examine Contract Documents to be assured that material to be ordered is appropriate for thickness and substrate to which it is to be secured and will function as intended.

### END OF SECTION

# SECTION 08 7102 HANGING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Hinges for flush wood and hollow metal doors.
- B. Related Requirements:
  - 1. Section 08 7101: 'Common Hardware Requirements'.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Hager Companies, St Louis, MO www.hagerhinge.com.
    - b. Ives, New Haven, CT www.iveshardware.com.
    - c. McKinney, Scranton, PA www.mckinneyhinge.com.
    - d. PBB, Ontario, CA www.pbbinc.com.
    - e. Stanley, New Britain, CT www.stanleyworks.com.
- B. Hinges:
  - 1. Doors:
    - a. Sizes:
      - 1) Non-Fire-Rated Doors:
        - a) 1-3/4 inch non-fire-rated wood doors in wood frames: 4 inches by 4 inches.
        - b) 1-3/8 inch wood or metal doors: 3-1/2 inches by 3-1/2 inches.
  - 2. Use non-removable pins on exterior opening doors.
  - 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Interior:
      - 1) Hager: BB 1279.
      - 2) Ives: 5BBI.
      - 3) McKinney: TA 2714.
      - 4) MacPro / McKinney: MPB79.
      - 5) PBB: BB81.
      - 6) Stanley: FBB 179.
    - b. Exterior:
      - 1) Hager: BB 1191.
      - 2) Ives: 5BBI.
      - 3) McKinney: TA 2314.
      - 4) PBB: BB21.
      - 5) Stanley: FBB 191.

#### PART 3 - EXECUTION: Not Used

#### END OF SECTION

# SECTION 08 7103 SECURING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Items for architectural wood or hollow metal doors:
    - a. Flush bolts.
    - b. Locksets and latchsets.
    - c. Deadbolts.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements.
  - 2. Miscellaneous padlocks by local Church FM Group.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
    - a. Performance Features:
      - 1) Exceeds 400,000 ANSI cycles.
      - 2) Single motion egress provides easy emergency exit.
      - 3) Full 1 inch throwbolt with saw resistant hardened steel roller pin.
      - 4) Anti-drill design deadbolt. Two (2) ball bearings inserted to prevent drill attacks.
      - 5) ADA-compliant thumbturn.

# 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Standard Key Delivery:
    - a. Include change keys with hardware.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer List:
    - a. Best Locks by Stanley, Indianapolis IN www.stanleysecuritysolutions.com.
    - b. Hager, St Louis, MO www.hagerhinge.com.
    - c. Ives, New Haven, CT www.iveshardware.com.
    - d. Marks USA, Amityville, NY www.marksusa.com.
    - e. Precision Hardware, Romulus, MI www.precisionhardware.com.
    - f. Rockwood, Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
    - g. Sargent, New Haven, CT www.sargentlock.com.
    - h. Schlage, Colorado Springs, CO www.schlage.com.
    - i. Von Duprin, Indianapolis, IN www.vonduprin.com.
    - j. Yale Commercial Locks, Lenoir City, TN www.yalecommercial.com.
- B. General:
  - 1. Backsets shall be 2-3/4 inches.
  - 2. Furnish lead shields where required.

- C. Flush Bolts:
  - 1. Rod length: 12 inch minimum.
  - 2. Type Two Acceptable Products:
    - a. Manual Flush Bolts (Wood Doors):

Hager 283D.
 Ives FB458.
 Rockwood 555.

- b. Equal as approved by Architect before installation. See Section 01 6200.
- 3. Dust Proof Strike:
  - a. Floor and/or threshold.
  - b. Type Two Acceptable Products:

Hager: 280X.
 Ives: DP2.
 Rockwood 570.

- 4) Equal as approved by Architect before installation. See Section 01 6200.
- D. Locksets And Latchsets:
  - 1. Design Criteria:
    - a. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
      - 1) ANSI/BHMA A156.02 Series 4000 Grade 2.
      - 2) Meet UL 3 hour fire rating.
      - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
      - 4) Door Lever:
        - a) Meet California code for 1/2 inch or less return to door.
  - 2. Lever Operated:
    - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Grade 2 Standard Duty Key-In Lever Cylindrical Locksets:
        - a) 7K Series Best Lock with 15D Lever by Stanley standard cylinders (I/C cores may be used when authorized by AEC).
        - b) 175 Series with American Lever by Marks USA.
        - c) 7 Line Series with L Lever by Sargent.
        - d) AL Series with Saturn (SAT) Lever by Schlage.
        - e) 5300LN Series with Augusta (AU) Lever by Yale.
- E. Deadbolts:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Match manufacturer of locksets.

### PART 3 - EXECUTION

### 3.1 CLOSE-OUT ACTIVITIES

- A. Owner's Instructions:
  - 1. Before Final Acceptance Meeting, send master keys to Facilities Manager.

# **END OF SECTION**

SECURING DEVICES - 2 - 08 7103

# SECTION 08 7104 OPERATING TRIM

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Interior push / pulls.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Standard Door Push / Pulls:
  - 1. Size: 15 inches by 3-1/2 inch.
  - 2. Type Two Acceptable Products:
    - a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
    - b. 39E, 30S by Hager, St Louis, MO www.hagerhinge.com.
    - c. 8200, 8302 by Ives, Wallingford, CT www.iveshardware.com.
    - d. 70B, 105x70B by Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
    - e. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION: Not Used

**END OF SECTION** 

OPERATING TRIM - 1 - 08 7104

# SECTION 08 7106 CLOSING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Closers for flush wood doors and hollow metal doors.
- B. Related Requirements:
  - 1. Section 08 7101: 'Common Finish Hardware Requirements'.
  - 2. Section 08 7108: 'Stops And Holders'.

#### 1.2 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Manufacturer's final, executed copy of warranty.

### 1.3 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's Standard Warranty, five (5) years minimum.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. 7900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
    - b. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
    - c. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoorcontrols.com.
    - d. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.
    - e. D-3550/D-3551 Series by Stanley, Indianapolis IN www.stanlesecuritysolutions.com.
- B. Surface-Mounted Overhead Door Closers:
  - 1. Closers provided under this Section shall be from same Manufacturer.
  - 2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
  - 3. Door Closers on doors that swing 180 degree as shown on Contract Documents:
    - a. Closers shall allow for 180 degree opening without engaging stop function. Wall stop or Floor stop is specified in Door Schedule and Section 08 7108, 'Stops And Holders'.
    - b. Closers shall have following features:
      - 1) Adjustable sweep speed.
      - 2) Adjustable backcheck.
      - 3) Non-handed, non-sized.
      - 4) Hold open arm function (Friction Hold Open) (Non-Fire-Rated Corridors).
  - 4. Door Closers on doors that swing 90 degree as shown on Contract Documents:
    - a. Closers shall allow for 100 degree opening with engaging stop function.
    - b. Closers shall have following features:
      - 1) Adjustable sweep speed.

- 2) Adjustable backcheck.
- 3) Non-handed, non-sized.
- 4) Hold open arm function with thumb turn or handle control (Cush And Hold) (Non-Fire-Rated Corridors).

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Mount closers on stop side of door wherever conditions permit.
- B. Through-bolt hardware-to-door connections.

### 3.2 ADJUSTING

A. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

# END OF SECTION

CLOSING DEVICES - 2 - 08 7106

# SECTION 08 7107 PROTECTIVE PLATES AND TRIM

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Kick plates.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Type Two Acceptable Manufacturers:
    - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
    - b. Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 www.hagerhinge.com.
    - c. Ives, Wallingford, CT www.iveshardware.com.
    - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
    - e. Equal as approved by Architect before installation. See Section 01 6200.
- B. Protective Plates:
  - 1. Material: 0.050 inch thick Stainless Steel.
  - 2. Sizes:
    - a. Kick Plates: 10 inches high by width of door less 3/4 inch on each side.

# PART 3 - EXECUTION: Not Used

#### END OF SECTION

# SECTION 08 7108 STOPS AND HOLDERS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
  - 1. Door stops.
- B. Related Sections:
  - 1. Section 08 7101: Common Hardware Requirements.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
    - b. Hager, St Louis, MO www.hagerhinge.com.
    - c. Ives, Wallingford, CT www.iveshardware.com.
    - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
    - e. Sargent, New Haven, CT (800) 906-6606 or (203) 562-2151 www.sargentlock.com.
- B. Stops:
  - 1. Use wall type stops unless indicated otherwise on Door Schedule.
  - 2. Provide model appropriate for substrate. Wall stops may be either cast or wrought.
  - 3. Type Two Acceptable Products:

a.		Interior Wall	Overhead.
b.	Hager	236W	
C.	Ives	WS407CCV	
d.	Rockwood	409	
e.	Glynn Johnson		GJ 90S
f.	Sargent		590S Series

### PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Interface With Other Work: When using overhead stops, coordinate installation with door closer and other door hardware.

### END OF SECTION

STOPS AND HOLDERS - 1 - 08 7108

# SECTION 08 7109 ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Acoustical seals.
  - 2. Smoke Gaskets.
  - 3. Sweep Strip (door bottom sweep) for hollow metal door only.
  - 4. Thresholds (metal) where required for wood doors and hollow metal doors.
  - 5. Weatherstripping for exterior hollow metal doors.
  - 6. Door bottoms/door sweeps.

### B. Related Requirements:

- 1. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for thresholds.
- 2. Section 08 7101: 'Common Finish Hardware Requirements' for general finish hardware requirements and Approved Suppliers.
- 3. Section 09 3013: 'Ceramic Tiling' for stone thresholds.
- 4. Section 09 6466: 'Wood Athletic Flooring' for flooring system thresholds.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. American Architectural Manufacturers Association (AAMA:
    - a. AAMA 609 & 609-09, 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined document).
    - b. AAMA 611-12, 'Voluntary Standards for Anodized Architectural Aluminum'.
    - AAMA 701/702-11, 'Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals'.
  - 2. National Association of Architectural Metal Manufacturers (NAAMM):
    - a. AMP 500-06, 'Metal Finishes Manual' for Architectural and Metal Products.
- B. Reference Standards:
  - 1. American National Standards Institute / Builders Hardware Manufacturers Association:
    - a. ANSI / BHMA A156.18-2012, 'Materials and Finishes'.
    - b. ANSI / BHMA A156.21-2014, 'American National Standard for Thresholds'.
  - 2. International Code Council / American National Standards Institute:
    - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Hager, St Louis, MO www.hagerhinge.com.
    - b. NGP National Guard Products, Memphis, TN www.ngpinc.com.
    - c. Pemko Manufacturing, Ventura, CA www.pemko.com.
- B. Acoustical Seals:
  - 1. Color as selected by Architect.
  - 2. Type One Acceptable Products:
    - a. Door Bottom Shoe for Wood Door:

- 1) 13VDkB by NGP.
- 2) 211DV by Pemko.
- b. Door Bottom Shoe for Metal Door:
  - 1) 779S-A by Hager.
  - 2) 35EV by NGP.
  - 3) 217AV by Pemko.
- c. Equal as approved by Architect before bidding. See Section 01 6200.

#### C. Smoke Gaskets:

- 1. Color as selected by Architect.
- 2. Type One Acceptable Products:
  - a. 726 by Hager.
  - b. 5050 by NGP.
  - c. PK 55 by Pemko.
  - d. Equal as approved by Architect before bidding. See Section 01 6200.

### D. Sweepstrip (metal door bottom):

- 1. Clear anodized aluminum with black neoprene insert.
- 2. Reduce infiltration of air, wind, dust, rain, and snow.
- 3. Meet UL requirements.
- 4. For use with saddle thresholds.
- 5. Type One Acceptable Products:
  - a. 750S CLR by Hager.
  - b. 198N A by NGP.
  - c. 321 CN by Pemko.
  - d. Equal as approved by Architect before bidding. See Section 01 6200.

### E. Thresholds:

- 1. Type One Acceptable Products:
  - a. Design Criteria:
    - 1) Meet handicap accessibility requirements (ADA):
  - b. Interior Doors at Acoustic Seals, Approved Products:
    - 1) Carpet threshold (carpet to carpet):
      - a) 505S DBA by Hager.
      - b) 414 DKB by NGP.
      - c) 236 D by Pemko.
    - 2) Carpet threshold (carpet to concrete, wood, synthetic, or resilient flooring:
      - a) 417 DKB by NGP.
      - b) 174 D by Pemko.
    - 3) Saddle threshold:
      - a) 418S DBA by Hager.
      - b) 411 DKB by NGP.
      - c) 151 D by Pemko.
  - c. Out swinging metal exterior doors (exterior Utility Rooms only):
    - 1) 891 V by NGP.
    - 2) 185 V by Pemko.
  - d. Equals as approved by Architect before bidding. See Section 01 6200.

# F. Weatherstripping:

- 1. Type One Acceptable Products:
  - a. Finish: clear anodized aluminum.
  - b. Perimeter:
    - 1) 800S by Hager.
    - 2) A625 A by NGP.
    - 3) 35041 CP by Pemko.
  - c. Equal as approved by Architect before bidding. See Section 01 6200.
  - d. Bottom (see Sweepstrip):

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Install smoke gaskets and acoustical seals in manner to give continuous air-tight fit.
  - 1. Install smoke gaskets as per Manufacturer's installation requirements:
    - a. Hinge Jamb: Install smoke gaskets on jamb face of door frame so door will compress smoke gasket.
    - b. Header and Strike Jamb: Install smoke gaskets on face of stop of door frame so door will compress smoke gasket.
  - 2. Install acoustical seal with seal under door.

END OF SECTION

ACCESSORIES - 3 - 08 7109

# SECTION 08 7913 KEY STORAGE AND CONTROL EQUIPMENT

### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Key cabinet.
- B. Related Requirements:
  - 1. Section 08 0601: Keying schedule.
  - 2. Section 08 7101: Common Hardware Requirements.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Key Cabinet:
  - 1. Provide cabinet with 60 hooks minimum.
  - 2. 20 ga steel with prime coat and provided with lock.

### PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Turn key cabinet over to Owner's designated representative at Substantial Completion with all keys required for every locking device on Project identified by tags and on hooks. Owner will be responsible for installation.

# END OF SECTION

# SECTION 08 8100 GLASS GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of glazing used in entries, doors, and windows.
- B. Related Requirements:
  - Sections Under 08 1000 Heading: 'Doors And Frames' for furnishing and installing of flush wood door lites in new doors.
  - 2. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for furnishing and installing of glazing in aluminum-framed storefront.
  - 3. Section 08 5113: Vinyl Windows' for furnishing and installing of glazing in windows.
  - 4. Section 11 9119: 'Font Railing' for glass provided in Font Railing.

#### 1.2 REFERENCES

- A. Definitions:
  - Glass Surface:

b.

- a. Insulated glass unit:
  - 1) Surface 1: Exterior surface of outer lite.
  - 2) Surface 2: Interspace-facing surface of outer lite.
  - 3) Surface 3: Interspace-facing surface of inner lite.
  - 4) Surface 4: Interior surface of inner lite.
  - Monolithic glass:
    - 1) Surface 1: Exterior surface.
    - 2) Surface 2: Interior surface.
- 2. Insulated Glass: Two pieces of glass spaced apart and hermetically sealed to form single-glazed unit with air space between. Heat transmission through this type of glass may be as low as half that without air space. Also called double glazing, double pane, insulated unit, and thermal pane.
- 3. Laminated Glass: Two or more sheets with inner layer of transparent plastic to which glass adheres if broken. Used for overhead, safety glazing, and sound reduction.
- 4. Low-Emissivity Glass (Low-E): Reduces wintertime heat loss from interior with thin, almost colorless metallic coating that reflects heat back inside structure. Allows moderate solar heat gain while reducing harmful ultraviolet light in any season. Minimizes summertime air conditioning loss by reflecting radiated heat to outside. May be tempered for where safety glass is required. Available in single strength clear, gray and bronze (brown) color.
- 5. Obscure Glass: Adds privacy where window coverings are impractical or undesirable. Various colors and texture patterns provide translucent or semi-opaque effect. May be tempered for use where safety glass is required.
- 6. Shading Coefficient: Ratio of solar heat gain passing through a glazing system to solar heat gain that occurs under the same conditions if the window was made of clear, unshaded double strength glass. Lower SC number, the better solar control efficiency of glazing system.
- 7. Solar Heat Gain Coefficient (SHGC): Ratio of total solar heat passing through a given window relative to the solar heat incident on the projected window surface at normal solar incidence. (Percentage of solar energy directly transmitted or absorbed and re-radiated into a building). Lower SHGC, the better it is able to reduce heat.
- 8. Solar Reflectance (R): Percent of incident solar radiation that is reflected by window film/glass system. Lower the number, the less solar radiation reflected.
- 9. Tempered Glass: Glass strengthened through process of heating, creating tensile strength that causes glass to resist breakage, yet disintegrate into small pieces if break occurs. Tempered glass is type of safety glass.
- 10. U-Value: Measurement of heat transfer through film due to outdoor/indoor temperature differences. Lower U-value, less heat transfers. When using performance data, the lower U-value, better insulating qualities of window film/glass system.
- 11. Visible Light Transmitted (VLT): Percent of total visible light (380-780 nanometers) that passes through glass. Lower the number, the less visible light transmitted.

- B. Reference Standards:
  - 1. American National Standards Institute:
    - ANSI Z97.1-2009, 'Safety Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test'.
  - 2. ASTM International:
    - a. ASTM C1036-16, 'Standard Specification for Flat Glass'.
    - ASTM C1048-12, 'Standard Specification for Heat-Treated Flat Glass Kind H, Kind FT Coated and Uncoated Glass'.
    - c. ASTM C1172-14, 'Standard Specification for Laminated Architectural Flat Glass'.
    - ASTM C1281-16, 'Standard Specification for Preformed Tape Sealants for Glazing Applications'.
    - e. ASTM E2190-10, 'Standard Specification for Insulating Glass Unit Performance and Evaluation'.
  - 3. Consumer Products Safety Commission (CPSC):
    - a. 16 CFR, Part 1201 CAT 1 and 11, 'Safety Standard for Architectural Glazing Materials'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - Product Data:
    - a. Manufacturer's data sheets for each glass product and glazing material.
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Glazing shall meet applicable requirements of Federal Consumer Product Safety Standard 16 CFR 1201.
  - 2. Comply with published recommendations of glass product Manufacturers and organizations, except where more stringent requirements are indicated.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Satisfactorily completed at least three (3) installations of similar size, scope, and complexity in each of past two (2) years and be approved by glass product Manufacturer before bidding.
    - b. Upon request, submit documentation.
- C. Certifications:
  - 1. Labels showing strength, grade, thickness, type, and quality are required on each piece of glass.
  - 2. Manufacturers/Fabricators certifying products furnished comply with project requirements.
  - Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Follow Manufacturer's instruction for receiving, handling, and protecting glass & glazing materials to prevent breakage scratching, damage to seals, or other visible damage.
  - 2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage And Handling Requirements:
  - 1. Follow Manufacturer's instruction for storing and protecting glass & glazing materials.

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- 2. Store materials protected from exposure to harmful environmental conditions and at temperatures and humidity conditions recommended by Manufacturer.
- 3. Protect edge damage to glass, and damage/deterioration to coating on glass.

### 1.6 FIELD CONDITIONS

#### A. Ambient Conditions:

 Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

### 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Insulating Glass Warranty:
    - a. Manufacturer's standard form, signed by insulating-glass product Manufacturer/Fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by obstruction of vision by dust, moisture, or film on interior surfaces of glass, for ten [10] years of date of installation.
  - 2. Installer's Warranty:
    - a. Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation, for two (2) years from date of installation.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Manufacturers:
  - 1. Manufacturer Contact List for Low E Glazing:
    - a. AGC Flat glass North America, Kingsport, TN www.us.agc.com.
    - b. Carlex (subsidiary of Central Glass Co., Ltd., Nashville, TN www.carlex.com.
    - c. Guardian Industries Corp., Auburn Hills, MI www.guardian.com.
    - d. Oldcastle BuildingEnvelope, Santa Monica, CA www.oldcastlebe.com.
    - e. Pilkington North America Inc., Toledo, OH www.pilkington.com.
    - f. PPG Industries, Pittsburgh, PA www.ppgglass.com or PPG Canada Ltd, Glass Division, Toronto, ON (416) 789-3331.
- B. Exterior Window Glazing:
  - 1. Thickness: 1/8 inch minimum, Double Strength (Insulated Glass).
  - 2. Glazing shall have following characteristics:
    - Low-Emissivity (or Low E):
      - 1) Design Criteria:
        - a) Clear:
        - b) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
        - c) Location: Surface 2.
      - 2) Type Two Low-Emissivity (or Low E) Acceptable Product:
        - Performance Standard:
          - (1) 70 percent Visible Light Transmission (VLT).
          - (2) 0.29 U-value winter.
          - (3) 0.27 U-value summer.
          - (4) 0.38 Solar Heat Gain Coefficent (SHGC).
          - (5) 0.44 Shading Coefficient.
          - (6) 11 percent Visible Light Reflectance.
        - b) Quality Standard:
          - (1) Cardinal LoE<sup>3</sup>-366.
          - (2) Solarban 70 XL.

- (3) Other low E glazing system standard with window manufacturer that meets or exceeds performance characteristics of specified glazing is acceptable as approved by Architect before bidding. See Section 01 6200.
- 3) Acceptable Manufacturers:
  - a) AGC.
  - b) Guardian.
  - c) PPG Industries.
  - d) Equal as approved by Architect before bidding. See Section 01 6200.
- b. Obscure:
  - Design Criteria:
    - a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern #62.
- c. Glazing in Windows within 24 inches of Exterior Doors:
  - 1) Design Criteria:
    - a) Tempered.
    - b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
- C. Storefront Glazing:
  - 1. Thickness: 1/4 inch.
  - 2. Glazing shall have following characteristics:
    - a. Low-Emissivity (or Low E):
      - 1) Design Criteria:
        - a) Clear.
        - b) Insulated Glass: 1 inch units with 1/2 inch airspace and two (2) 1/4 inch lites.
        - c) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
        - d) Location: Surface 2.
      - 2) Type Two Low-Emissivity (or Low E) Acceptable Product:
        - a) Performance Standard:
          - (1) 64 percent Visible Light Transmission (VLT).
          - (2) 0.28 U-value winter.
          - (3) 0.26 U-value summer.
          - (4) 0.27 Solar Heat Gain Coefficent (SHGC).
          - (5) 0.32 Shading Coefficient.
          - (6) 12 percent Visible Light Reflectance.
        - b) Quality Standard:
          - (1) Cardinal LoE<sup>3</sup>-366.
          - (2) Solarban 70 XL.
          - (3) Equal product by Acceptable Manufacturer as approved by Architect before bidding. See Section 01 6200.
      - 3) Acceptable Manufacturers:
        - a) AGC.
        - b) Guardian.
        - c) PPG.
        - d) Equal as approved by Architect before bidding. See Section 01 6200.
    - b. Obscure:
      - 1) Design Criteria:
        - a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern #62.
    - c. Glazing Below Door Height:
      - 1) Design Criteria:
        - a) Tempered.
        - b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
- D. Fabrication:
  - 1. Except where glass exceeds 66 inches in width, cut clear glass so any wave will run horizontally when glazed.
  - 2. Install muntins for exterior aluminum entries and aluminum windows between panes of insulating glazing units. No muntins on interior Vestibule storefront entries.
  - 3. Sealed, Insulating Glazing Units:
    - a. Double pane, sealed insulating glass units. Install at exterior windows and exterior aluminum-framed storefront.
    - b. Unit Thickness: 5/8 inch minimum, one inch maximum.
    - c. Insulated obscure units shall consist of one pane of specified obscure glass and one pane of standard glass.
    - d. Type Seal:
      - 1) Metal-to-glass bond and separated by 1/2 inch dehydrated air space.

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- 2) Use non-hardening sealants.
- e. Category Four Approved Fabricators. See Section 01 6200 for definitions of Categories.
  - 1) Members of Sealed Insulating Glass Manufacturer's Association.

# 2.2 ACCESSORIES

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Glazing Tape: Butyl-based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation, complying with ASTM C1281 and AAMA 800 for application.

PART 3 - EXECUTION: Not Used

END OF SECTION

GLASS GLAZING - 5 - 08 8100

# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

#### **DIVISION 9 - FINISHES:** 09 0000 Finishes 09 0503 Flooring Substrate Preparation 09 2000 Plaster and Gypsum Board Non-Structural Metal Framing 09 2216 09 2226 Metal Suspension Systems: Gypsum Board Gypsum Board 09 2900 09 3000 Tilling 09 3013 Ceramic Tiling 09 5000 Ceiling 09 5113 **Acoustical Panel Ceilings** 09 5116 Acoustical Tile Ceilings 09 5323 Metal Acoustical Suspension Assemblies 09 6000 Flooring 09 6466 Wood Athletic Flooring 09 6513 Resilient Base and Accessories Tile Carpeting 09 6813 Sheet Carpet / Urethane Cushion, Direct Glue 09 6816 09 7000 Wall Finishes 09 7216 Vinyl-Coated Fabric Wall Covering 09 7226 Sisal Wall Coverings 09 7314 Acoustic Wall Coverings - Grille Material **Acoustical Treatment** 09 8000 09 8413 Fixed Sound-Absorptive Panels Paints and Coatings 09 9000 09 9001 Common Painting and Coating Requirements 09 9112 Exterior Painted Ferrous Metal 09 9113 Exterior Painted Galvanized Metal 09 9114 Exterior Painted CMU 09 9121 Interior Painted Poured Concrete 09 9123 Interior Painted Gypsum Board, Plaster 09 9124 Interior Painted Metal 09 9125 Interior Painted Wood Interior Clear-Finished Hardwood 09 9324 09 9413 Interior Textured Finishing

DIVISION 09 FINISHES

# SECTION 09 0503 FLOORING SUBSTRATE PREPARATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Coordination and scheduling of Owner Furnished Testing for Alkalinity and Concrete Moisture Testing of concrete slab as described in Contract Documents.
  - 2. Preparing floor substrate to receive flooring as described in Contract Documents.

### B. Related Requirements:

- 1. Pre-Installation conferences held jointly with Section 09 0503 as described in Administrative Requirements on Part 1 of this specification section.
- 2. Section 01 1200: 'Multiple Contract Summary'.
- 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 4. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation tolerances for concrete slabs.
- 5. Section 09 6466: 'Wood Athletic Flooring'.
- 6. Section 09 6813: 'Tile Carpeting'.
- 7. Section 09 6816: 'Sheet Carpeting'.

### 1.2 REFERENCES

- A. Association Publications:
  - International Concrete Repair Institute: 'ICRI Concrete Slab Moisture Testing Program' Rosemont, IL www.icri.org.
    - a. ICRI Certification: 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1'.

### B. Reference Standards:

- 1. ASTM International:
  - a. ASTM F710-11, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
  - b. ASTM F1869-16a, 'Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride'.
  - c. ASTM F2170-16b, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference held jointly if possible for all related Division 09 6000 'Flooring' used for Project.
  - 2. Schedule conference after substrate preparation and before installation of all flooring systems included for Project at same time if schedule permits.
  - 3. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
  - 4. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review condition of floor with regards to compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.
    - b. Review Testing Agency testing report of Concrete Moisture of concrete:
      - 1) Installer may verify Concrete Moisture of concrete.
  - 5. Review condition of floor with regard to compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.
  - 6. Review additional agenda items all related flooring sections.

### B. Scheduling:

- 1. Concrete Moisture Testing:
  - a. General Contractor Responsibility to provide:
    - 1) Maintain ambient temperatures and relative humidity conditions as specified in Field Conditions in Part 1 of this specification before Moisture Testing Agency will test for concrete moisture.
    - 2) Notify Owner to contact Moisture Testing Agency when building is enclosed and temperature and relative humidity meet requirements for testing.
    - 3) Provide access for and cooperate with Moisture Testing Agency.
  - b. Owner's Representative Responsibility to provide:
    - 1) Provide following information to Moisture Testing Agency at time of notification:
      - a) Digital copy of floor plan(s).
      - Indicate different flooring material areas and which rooms on floor plan(s) and finish schedule requiring additional tests if required.
      - Digital copy of Specification Section 09 0503 (this specification) from Contract Documents for this Project.
    - 2) Notify Moisture Testing Agency with 'Concrete Moisture Testing Request and Proposal' when building is enclosed and temperature and relative humidity meet requirements for testing:
      - Moisture Testing dates are established based on installation of carpet. To avoid testing 'green concrete' as much as possible, following schedule has been established for moisture testing:
        - (1) Notification by Owner' Representative to Testing Agency to be at least SIXTY-FIVE (65) days minimum before installation of Sheet Carpeting. Proposed moisture testing date will be between THIRTY (30) and THIRTY-FIVE (35) of installation of carpet and identified on 'Concrete Moisture Testing Request and Proposal'.
        - (2) Testing Agency has THIRTY (30) days to schedule moisture testing with Owner.
        - (3) Testing Agency has no more than FIVE (5) calendar days to complete Moisture Testing and issue 'Certified Moisture Testing Report'.
        - (4) 'Certified Moisture Testing Report' to be given to Owner's Representative no less than THIRTY (30) days minimum before installation of Sheet Carpeting.
        - (5) Owner's Representative to give Carpet Manufacture(s) 'Certified Moisture Testing Report' THIRTY (30) days before installation of carpet.
  - c. Testing Agency will provide Moisture Testing for following flooring areas:
    - 1) Sheet Carpeting:
      - a) Moisture Testing for Sheet Carpeting required.
      - b) Moisture Testing and Testing Report requirements specified in Informational Submittals.
      - c) See individual flooring section for additional scheduling requirements if required.
    - 2) Tile Carpeting:
      - a) Moisture Testing for Tile Carpeting required.
      - Moisture Testing and Testing Report requirements specified in Informational Submittals.
      - c) See individual flooring section for additional scheduling requirements if required.
    - 3) Wood Athletic Flooring:
      - a) Moisture Testing for Wood Athletic Flooring required.
      - b) Moisture Testing and Testing Report requirements specified in Informational Submittals.
      - c) See individual flooring section for additional scheduling requirements if required.

#### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Concrete Slab Moisture Technician:
      - Provide current IFTI trained documentation and certified Field Technician certification. and/or
      - 2) Provide current ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification.
    - b. Certified Standard Moisture Testing Report:
      - 1) Report to include following:
        - a) Available to Testing Agency from Owner's Representative:
          - (1) Project Name.
          - (2) Property Number.
        - b) Test date.
        - c) Executive summary.
        - d) Certified Moisture and Alkalinity (pH) Test Report.
        - e) Project floor plan.
        - f) Project photographs including following information on each photograph:
          - (1) Site location.

- (2) Test hole number.
- (3) Serial number probe.
- (4) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
- (5) Property number.
- Outlier Test (As specified in Field Quality Control Testing in Part 3 of this specification:
  - (1) Note test as Outlier Test for which hole number was conducted.
  - (2) Site location.
  - (3) Test hole number.
  - (4) Serial number probe.
  - (5) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
  - (6) Property number.
- 2) At completion of testing, Testing Agency shall submit Concrete Moisture Test Report for each flooring system included for project to following:
  - a) One (1) copy to Owner's Representative.
- 2. Special Procedure Submittals:
  - a. 'Concrete Moisture Testing Request and Proposal':
    - 1) Provided by Owner's Representative for each project to Testing Agency:
      - Testing Agency to fill out form with following information and return as instructed:
        - (1) Review request information.
        - (2) Add information as requested.
        - (3) Sign form.
        - (4) E-mail form back to Owner's Representative.
  - b. Certified Moisture Testing Report Distribution:
    - 1) Owner's Representative responsibilities after receiving Concrete Moisture Test Report:
      - a) Provide copies to following:
        - (1) One (1) copy to Architect.
        - (2) One (1) copy to Contractor.
        - (3) One (1) copy to Owner Furnished Carpet Manufacturer.
    - General Contractor responsibilities after receiving Concrete Moisture Test Report from Owner's Representative:
      - a) Provide copies to following:
        - (1) One (1) copy to Wood Athletic Flooring Manufacturer.
  - c. Moisture Testing Report Instructions:
    - 1) Carpet floor area testing for Alkalinity and Concrete Slab Moisture by Testing Agency Testing:
      - a) If 'all' Testing Agency's Special Procedure Submittal for RH concrete slab moisture testing results are less than ninety-one (91) percent:
        - (1) Include Option A as specified in Section 09 6813 and Section 09 6816.
      - b) If 'any' Testing Agency's Special Procedure Submittal for RH concrete slab moisture testing results are ninety-one (91) percent or above, but less than ninety-six (96) percent maximum or less:
        - (1) Include Option B as specified in Section 09 6813 and Section 09 6816.
      - c) If 'any' Testing Agency's Special Procedure Submittal for RH concrete slab moisture testing results are ninety-six (96) percent or more:
        - (1) Include Option C as specified in Section 09 6813 and Section 09 6816.
      - d) Testing pH at surface of concrete slab must be conducted in accordance with ASTM F 710 not to exceed 9 pH.
        - (1) If pH is equal to or less than 9, proceed with installation according to manufacturing installation guidelines and in accordance of Contract Documents.
        - (2) If pH exceeds 9 and manufacture recommended cure exceeds \$500, contact Church Headquarters at carpet@ldschurch.org or call Carpet Contract Manager in Purchasing before proceeding with installation.
    - Wood Athletic Flooring area testing for Alkalinity and Concrete Slab Moisture by Testing Agency Testing:
      - a) If Testing Agency Testing Results are eighty-five (85) percent RH or more as recommended by MFMA and/or pH level 9 or higher:
        - (1) Remediation to be discussed with Owner's Representative and Athletic Wood Flooring Manufacturer. For questions, contact Church Headquarters Wood Athletic Flooring Contract Manager in Purchasing at flammjd@ldschurch.org before proceeding with installation.

- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture testing.

### 1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
  - 1. Owner will provide Field Testing for Alkalinity and Concrete Moisture of concrete slab before installation as specified in Field Quality Control in Part 3 of this specifications for flooring:
    - a. See Section 01 1200: 'Multiple Contract Summary'.
    - b. See Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 2. Category One VMR Testing Agency. See Section 01 6200 for definitions of Categories:
    - a. IFTI Independent floor Testing & Inspection, Inc.:
      - 1) Contact Information: James Pouliot:
        - a) 1850 Gateway Blvd. Suite 230 Concord, CA 94520.
        - b) Phone: Office (800) 490-3657 x 207 or Cell (925) 819-1780.
        - c) Fax (877) 814-0338.
        - d) E-mail james.pouliot@ifti.com.

#### B. Qualifications.

- 1. Concrete Slab Moisture Technician:
  - IFTI trained and certified Field Technician.
     and/or
    - b. ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification:
      - Certification includes three (3) hour education session, written exam, and field testing performance exam based on ASTM standards.
      - 2) Certification valid for period of five (5) years from date of testing completion.
  - c. Provide documentation.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Provide storage space and protection for flooring and installation accessories if materials are delivered before start of flooring installation.

### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building (service conditions). Service conditions include normal levels of humidity, lighting, heating, and air conditioning:
    - a. If service conditions are not possible, test conditions shall be 75 deg F ± 10 deg F maintain relative humidity between forty (40) and sixty (60) percent in spaces to receive testing.
  - 2. Maintain these conditions forty-eight (48) hours prior to, and during testing. Otherwise, results may not accurately reflect amount of moisture which is present in concrete slab or would normally be emitted from or through concrete slab during normal operating conditions.

#### PART 2 - PRODUCTS Not Used

### PART 3 - EXECUTION

# 3.1 PREPARATION

#### A. Flooring Preparation:

- General:
  - a. Prepare floor substrate in accordance with ASTM F710, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring' (This standard is used for preparing concrete floors for all flooring).
    - 1) Required RH test and alkalinity test of concrete slab has been performed.
  - b. Concrete floor slab patching:
    - 1) Cracks, chips and joints must be properly patched or repaired.
  - c. Concrete surface cured, clean, dry, and free of dirt, dust, grease, wax, and other foreign substances that will compromise flooring installations.
    - 1) Removal of curing compounds.
    - 2) Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
    - 3) Removal of overspray from painted walls (essential so glue will stick).
    - Vacuum and damp mop floor areas to receive flooring before flooring installation.
- 2. Carpeted floor areas:
  - a. Prepare floor substrate in accordance with Carpet And Rug Institute (CRI) best practices to receive carpet installation and to provide installation that meets Carpet Manufacturer's warranty requirements.

#### B. Carpet Accessories:

1. Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

#### 3.2 FIELD QUALITY CONTROL

### A. Field Tests:

- General:
  - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
- 2. Concrete Moisture and Alkalinity:
  - a. Testing Agency will test interior concrete slabs before installation of floor coverings as directed by Architect and will include following:
    - 1) Interior concrete slab areas to be tested:
      - a) Section 09 6466 'Wood Athletic Flooring'.
      - b) Section 09 6813 'Tile Carpeting'.
      - c) Section 09 6816 'Sheet Carpeting'.
    - 2) Standard Moisture Testing required of interior concrete slabs on grade:
      - a) General:
        - (1) Testing for concrete moisture shall be taken at concrete slab substrates scheduled to receive flooring as specified in Contract Drawings for complete flooring installation.
        - 2) Outlier Test: If one (1) test is abnormally different from other moisture tests, then additional test should be done. Outlier will be defined in this specification as moisture test that is at least fifteen (15) percent higher or lower than other tests at project building completed same day:
          - (a) Retesting should be done within 5 feet of original test hole.
          - (b) Contact Owner's Representative for the need to outlier test and additional testing fees will apply.
        - (3) Include required tests for carpeting and additional tests at each different type of flooring system included for project.
        - (4) Carpet area moisture testing may be performed sooner than other flooring areas such as athletic flooring if included for Project, but should be tested at same time.
      - b) Meetinghouse:

- (1) Test sites required where floor coverings will be installed. Include at least four (4) required tests for carpeting. Provide additional tests at each different type of flooring system included for project. Following are recommended tests required:
  - (a) One (1) test near center of Chapel if included for Project. If no chapel, select another carpeted location as dictated by building layout.
  - (b) Three (3) minimum additional tests in wood athletic flooring area.
  - (c) Provide additional testing as directed by Architect if necessary.
- b. Approved Concrete Moisture Tests:
  - Concrete Moisture Test (test used with Standard Moisture Testing if included for project). See Section 01 6200:
    - a) Relative Humidity (RH) testing using in-situ probes in accordance with ASTM F2170 testing requirements:
      - (1) Check calibration of measuring instrument.
      - (2) Building ambient conditions are met before testing.
      - (3) Drill Hole:
        - (a) Drill and prepare test holes as per ASTM F2170 (correct hole-depth and hole diameter are required).
        - (b) Drill holes equal to forty (40) percent of slab's thickness for concrete slabs on grade and twenty (20) percent of slab's thickness for suspended concrete slabs (hole must be perpendicular (90 deg) to surface).
      - (4) Clean Hole:
        - Follow Manufacturer's installation instructions for cleaning holes and inserting sensor.
      - (5) Insert Sensor:
        - (a) Follow Manufacturer's installation instructions for inserting sensor.
      - (6) Readings:
        - (a) Follow Manufacturer's installation instructions for taking readings.
        - b) Two (2) hours after installation of sensor, RH reading will be recorded. (Two (2) hour read is in lieu of the seventy-two (72) hour ASTM standard)
      - (7) Future Testing:
        - (a) For future readings, replace protective cap by snapping it back into sensor.
      - (8) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.
        - (a) For future readings, replace protective cap by snapping it back into sensor.
    - category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Concrete moisture testing meter:
        - (a) Rapid RH 4.0 EX with Touch-n-Sense Technology and Rapid RH EX Smart Sensors by Wagner Meters, Rogue River, OR www.wagnermeters.com.
  - 2) Alkalinity Testing (pH) Test:
    - a) Testing shall be performed in accordance with ASTM F710.
    - b) Test with pH meter or pH paper.
    - Testing shall be taken at every location and at each time concrete moisture test is performed at those locations.
    - d) Clean floor to remove all oil, dirt, dust and any floor coating or sealer.
      - (1) Lightly grind, sand, or bead blasting. Do not remove more than 1/8 inch of concrete.
      - (2) Removal of more than 1/8 inch may give high pH reading.
      - (3) Failure to remove laitance will produce low, inaccurate pH reading.
    - Place several drops of water on clean surface, forming puddle approximately 1 inch:
      - (1) Allow puddle to set for sixty (60) ± five (5) seconds, then dip pH paper or meter into water.
      - (2) Remove immediately and record test result.
    - f) Testing to be performed concurrently with concrete moisture testing.
    - g) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.

### END OF SECTION

# **ATTACHMENTS**



# Concrete Moisture Testing Request and Proposal

Owner's Representative to complete Concrete Moisture Testing Request section below. Send completed form to the Testing Agency. Testing Agency will complete Concrete Moisture Testing Proposal section and submit to Owner's Representative.

Concrete Moisture Testing Reques	st								
Project Information									
Project Name			Date						
Project address			Property nu	umber					
City			Plan Type (	(new constr	ruction (	only)			
State Zip Code			Project Typ	e Construction	∩n	Existin	σ		
Facility type				0011011 01011	<u> </u>	2,1101111	0		
	Temple Reside	ential	Family F	listory	Highe	r Educati	on V	Nelfare	Facility
Type of new flooring to be installed (chec Carpet Wood Res	k all that apply): ilient            Seaml	ess	Resinou	ıs S	Synthet	ic Athleti	r.		
Type of slab	morit Coarm		110011101		Age of		<u> </u>		
Below grade On grade	Above grad	e/susper	nded			years	mo	onths	
Billing and Owner Contact Information									
Submit quote and report to: Proje	ect Manager	Facilitie	es Manager						
Project Manager		Phone			E-mail				
Facilities Manager		Phone			E-mail				
Billing address (Send Report to this address)			ddress						
City					State		Z	Zip cod	e
<ul> <li>Digital copy of floor plans(s).indicate which areas on floor planton in the planton indicate which areas on floor planton in the planton indicate which areas on floor planton indicate which is planton in the planton in the</li></ul>	s(s) and/or finish so on 09 0503 from Co uction: by to schedule the to	chedule ontract D esting.	requiring ac ocuments t		ject.		Rush ser Yes	rvice re	equested o
New and R & I CES/S&I (stand-alone)	<u> </u>		Stallation	Proposed t	tocting	tata	Number	of tost	
Allow thirty (30) days for testing agence Testing and report to be completed 15	y to schedule the te	esting.	stallation.	Froposeu	iesiing (	Jale			09 0503
Reference information: Testing as per Section 09 0503 for floor Contractor or Owner.	or preparation and a	ambient	condition re	equirement	s to be	performe	ed prior to	o testin	g by
<b>Concrete Moisture Testing Propos</b>	al			Proposal	#:				
Testing Agency Contact Information									
IFTI Independent Floor Testing & Insp 1850 Gateway Blvd., Suite 230, Conc		Contac E-mail	ct: James l : james.p	Pouliot ouliot@ifti.	com	Phone: Fax:	(800) 490 (877) 81		ext. 207
<b>Directions</b> : Use this document to provide Review the request Information above.									
Scope of Work				Comme	ents				Cost
Standard Testing								\$	
Outlier Test Comprehensive Moisture Testing								\$ \$	
Additional Testing (if requested by Owne	er or Architect)							\$	
Additional results (il requested by Owne	or Arternitotty	<u> </u>					Total	_	
Signatures This form must be signed before to	esting can proceed.							T	
Testing Agency:			Owner Repr	esentative:					

## Carpeting Pre-Installation Conference and Carpeting Checklist

Project Information				
	Scheduled Date of Carpet Installation	Conference Date		
Project Name:				
-1	Address:	Property		
FNA O	Number			
FM Group	FM Office Name:			
FM Address	Address:			
Project Description				
Conference Attenda	nce			
Architect	Name:			
Contractor	Name:			
Project Manager	Name:			
Facility Manager Other	Name:	Title:		
Other	Name:	Title:		
Other	Name:	Title:		
Manufacturer	Name:			
Carpet Installer	Company:	Name:		
	Carpeting	g Checklist		
Schedule and Co				
	carpet schedule for furnishing and installation ca	irpet		
	arrangements for building access and utilities			
	meeting scheduled for inspection and sign-off			
	coordination between other trades			
Existing Projects				
	os removal issues (for removal and installation onl	у		
	extent of furniture moving, if required			
		airs, or other furnishings prior to their removal, if required		
Examination and	•			
	Review Section 09 6816 'Sheet Carpeting' for floor preparation requirements			
_	eview building conditions and note areas of existing damage or other conditions not responsibility of carpet installer			
_	Review work necessary to prepare floors for installation of flooring			
	Review if concrete flatness tolerance requirements meet specifications			
	if additional leveling or patching may be required			
	Review ambient condition requirements as specified in Specification Section 09 6816 'Sheet Carpeting'			
	conditions not in compliance with installation req	uirements		
Scope of Work				
	scope of work outlined on Carpet Request Inform	nation Sheet submitted to Carpet Manufacturer		
	Concrete Moisture Report			
Review	Review Carpet color, type, and locations			
☐ Review	Review quantity of rolls and dye lots			
Review	Review if Tile Carpeting is included for installation as specified in Section 09 6813 'Tile Carpeting'			
Review if Base is included as specified in Section 09 6513 'Resilient Base and Accessories'. Note locations used				
☐ Review	·			
	eview protection requirements of carpet after installation of carpeting			
acknowledge that the C	arpeting Checklist does not cover all requirements garding changes in original scope of work and un	stallation conference and all items have been reviewed and addressed. Is as specified for Project Specifications. Before installation, resolve any foreseen conditions. Signed Checklist to be given to Owner's Representative		
		Data		
Installer Signature:		Date:		

### SECTION 09 2216 NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal framing and furring systems and blocking as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wood blocking.
  - 2. Section 09 2226: 'Metal Suspension System' for furring on suspended ceilings.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. Steel Framing Industry Association (SFIA):
    - a. SFIA 'Technical Guide for Cold-Formed Steel Framing Products', www.sfia.net.
  - 2. Steel Stud Manufacturers Association (SSMA):
    - a. 2015 IBC SSMA 'Product Technical Guide'.

#### B. Definitions:

1. Non-Structural Member: Member in steel-framed system that is not part of the gravity load resisting system, lateral force resisting system or building envelope.

### C. Reference Standards:

- 1. American Iron and Steel Institute (AISI):
  - a. AISI S220-11, 'North American Specification For The Design Of Cold-Formed Steel Framing Nonstructural Members'.
- 2. ASTM International:
  - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - b. ASTM A1003/A1003M-15, 'Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members'.
  - c. ASTM C645-14, 'Standard Specification for Nonstructural Steel Framing Members'.
  - d. ASTM C754-15, 'Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products'.
  - e. ASTM C1513-13, 'Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections'.
  - f. ASTM E119-15, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - Schedule pre-installation conference to be held after submittals have been reviewed and returned by Architect, but before beginning metal framing work.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Identify location of required blocking.

### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:

- a. Show special components and installations not fully dimensioned or detailed in Manufacturer's Product data.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. ATI, ICC or other Approved Testing Agency (active member) Evaluation Report.
  - 2. Manufacturer Instructions:
    - a. Technical product data, installation instructions, and recommendations for each component of system.

### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - ICC approved.

### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Manufacturers:
  - L. Type One Acceptable Manufacturers:
    - a. CEMCO, City of Industry, CA www.cemcosteel.com.
    - b. ClarkDietrich Building Systems, West Chester, OH www.clarkdietrich.com.
    - c. Any member of Steel Framing Industry Association (SFIA).
    - d. Any member of Steel Stud Manufacturer's Association (SSMA).
    - e. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Materials:

- Framing:
  - a General
    - 1) 20 gauge minimum, unless noted greater on Drawings, meeting requirements of ASTM C645.
    - Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
    - 3) Steel Coating Requirement: Comply with ASTM C645 roll-formed from hot dipped galvanized steel complying with ASTM A1003/A1003M and/or ASTM A653/A653M G40 (Z120) or equivalent corrosion resistant coating. A40 galvannealed products are not acceptable.
      - Coatings shall demonstrate equivalent corrosion resistance with evaluation report from approved testing agency.
  - Steel Studs and Runners: Cold-formed galvanized steel C-studs, as per ASTM C645 for conditions indicated.
  - c. Bridging, blocking, strapping, and other accessories shall be as described in Contract Documents or as required by Manufacturer's system.

### C. Fasteners:

1. Corrosion resistant coated, self-drilling, self-threading steel drill screws complying with ASTM C1513.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with other Sections to provide blocking necessary for their work.
  - Coordinate with other Sections for location of blocking required for installation of equipment and building specialties.

### B. Tolerances:

- 1. 1/4 inch in 20 feet, non-cumulative in length of wall.
- 2. 1/8 inch in 10 feet with 1/4 inch maximum in height of wall.
- 3. Distances between parallel walls shall be 1/4 inch maximum along length and height of wall.

### C. Framing:

- 1. Installation Standard: ASTM C754.
- Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are required by Contract Documents.

END OF SECTION

# SECTION 09 2226 METAL SUSPENSION SYSTEM: Gypsum Board

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal suspension system for supporting gypsum drywall in typical ceiling and soffit areas and to support items penetrating ceiling as described in Contract Documents including:
    - a. Hanger wires, fasteners, main runners/tees, cross runners/tees, and wall molding/track.

### B. Related Requirements:

- 1. Section 09 2900: 'Gypsum Board'.
- 2. Section 09 5116: 'Acoustical Tile Ceilings'.
- 3. Section 26 5100: 'Interior Lighting' for electrical fixtures installed in ceiling.
- 4. Division 21: 'Fire Suppression' for sprinklers installed in ceiling.
- 5. Division 23: 'Mechanical' for related sections for HVAC installed in ceiling.
- 6. Division 26: 'Electrical' for related electrical work.
- 7. Division 27: 'Communications' for related sound and video work.

### 1.2 REFERENCES

#### A. Association Publications:

- The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. www.cisca.org.
  - a. 'Ceiling Systems Handbook': Recommendations for direct hung acoustical tile and lay-in panel ceiling installation.
  - CISCA 0-2, 'Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (zones 0-2)'
    Covers Seismic Design Category C.
  - c. CISCA 3-4, *'Guidelines for Seismic Restraint for Direct*-hung Suspended Ceiling Assemblies (zones 3-4)' Covers Seismic Design Category D, E, and F.
  - d. 'Production Guide': Practical reference for ceiling systems and estimating costs.

### B. Definitions:

- 1. Ceiling Suspension System: System of metal members, designed to support a suspended ceiling. May accommodate lighting fixtures or air diffusers.
- 2. Clips: Designs to suit applications such as fire resistance, wind uplift and impact.
- Compression Post (Vertical Strut, Seismic Struts): Rigid member used to provide lateral force bracing of suspension system.
- 4. Cross Runner, Cross Tee: Cross runner is secondary or cross beams of mechanical ceiling suspension system, usually supporting only acoustical tile. Cross tee is inserted into main runner to form different module sizes. In some suspension systems, however, cross runners also provide support for lighting fixtures, air diffusers and other cross runners.
- 5. Hanger Wires: Wire employed to suspend acoustical ceiling from existing structure. Standard material is 12 gauge 0.105 inch galvanized, soft annealed steel wire, conforming to ASTM A641/A641M. Heavier gauge wire is available for higher load carrying installations, or situations where hanger wire spacing exceeds 4 feet on center. Seismic designs or exterior installations subject to wind uplift may require supplemental bracing or substantial hanger devices such as metal straps, rods or structural angles.
- 6. Heavy-Duty Systems: Primarily used for installations in which the quantities and weights of ceiling fixtures (lights, air diffusers, etc.) are greater than those for ordinary commercial structure.
- 7. Main Beam, Main Runner, Main Tee: Primary or main beams of type of ceiling suspension system in which structural members are mechanically locked together. Provide direct support for cross runners and may support lighting fixtures and air diffusers, as well as acoustical tile. Supported by hanger wires attached directly to existing structure; or installed perpendicular to carrying channels and supported by specially designed sheet metal or wire clips attached to carrying channels.
- 8. Splay Wires: Wires installed at angle rather than perpendicular to grid.
- 9. Stiffening Brace: Used to prevent uplift of grid caused by wind pressure in exterior applications.

### C. Reference Standards:

- 1. American Society of Civil Engineers/Structural Engineering Institute:
  - a. ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures'.
- 2. ASTM International:
  - a. ASTM A641/A641M-09a(2014), 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'.
  - b. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - c. ASTM A1008/A1008M-16, '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'.
  - d. ASTM C635/C635M-13a, 'Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings'.
  - e. ASTM C636/C636M-13, 'Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels'.
  - f. ASTM C645-14, 'Standard Specification for Nonstructural Steel Framing Members'.
  - g. ASTM C754-17, 'Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products'.
  - h. ASTM C841-03(2013), 'Standard Specification for Installation of Interior Lathing and Furring'.
  - i. ASTM D610-08(2012), 'Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces'.
  - j. ASTM E119-16a, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
  - k. ASTM E580/E580M-11b, 'Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions'.
- 3. International Building Code (IBC) (2015 or latest approved edition):
  - a. IBC 808.1.1.1, 'Suspended Acoustical Ceiling'.
- 4. Underwriters Laboratories (UL):
  - a. UL 263: 'Standard for Fire Test of Building Construction and Materials' (14th Edition).
  - b. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (10th Edition).

#### 1.3 ADMINISTRATIVE REQUIREMENTS

### A. Coordination:

- 1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including drywall furring, light fixtures, HVAC equipment, and fire-suppression systems.
- 2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

### 1.4 SUBMITTALS

### A. Action Submittals:

- 1. Product Data:
  - a. Provide Manufacturer's technical literature on suspension system including listing dimensions, load carrying capacity and standard compliance.
- 2. Samples:
  - a. Minimum 8 inch long samples of suspension system components, including main runner/tee and cross runner/tee with couplings.

### B. Informational Submittals:

- 1. Certificates:
  - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
  - b. Installer's certificates of training.
  - Manufacturer's Instructions:
    - a. Seismic Design Categories D, E and F:
      - Manufacturer's details and installation instructions for seismic bracing. If requested, provide copy of code requirements applicable to Project.

### 1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

- 1. All system components conform to ASTM standards.
- 2. Fire-Resistance Rating: UL approved metal suspension system.
- 3. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand effects of earthquake motions according to following requirements:
  - a. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's 'Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2 (Apply to Seismic Categories A & B).
  - b. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's 'Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4' (Apply to Seismic Categories C, D, E & F).
  - c. Seismic Design Categories D, E and F:
    - Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
    - Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Installer:
    - a. Installer training ('Ceiling Masters' training course or equivalent).
  - 2 Manufacturer
    - a. Manufacturer in good standing of CISCA (Ceiling and Interior Systems Construction Association).

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Store material in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and general damage.

### 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer standard ten (10) years warranty on suspension system including repair or replacement of rusting as defined by ASTM D610.

### PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Systems:
    - a. Drywall Grid by Armstrong World Industries, Lancaster, PA www.armstrongceilings.com.
    - b. Drywall Grid System by Chicago Metallic Corporation, Chicago, IL www.chicagometallic.com.
    - c. Drywall Suspension System Flat Ceilings by USG, Chicago, IL www.usg.com.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Components:
  - 1. Main Runners/Tee and Cross Runners/Tee:
    - a. Heavy-duty in accordance with ASTM C635/C635M.
    - Cold-formed from ASTM A653/A653M, CS Type B steel and hot dipped galvanized G-40 coating for interior ceilings.
    - c. Double-Web construction.
  - 2. Wall Track/Molding.
  - 3. Fasteners:
    - a. Nails are not permitted when subjected to direct tension such as installed vertically into bottom of structural member.

- b. Metal attachment:
  - 1) Acoustical Eye Lag Screws:
    - a) 1/4 inch screws zinc coated with self-drilling or self-piercing sharp point.
- c. Wood attachment:
  - 1) Acoustical Eye Lag Screws:
    - a) 3 inch x 1/4 inch screws zinc coated for wood joists with Type 17 self-drilling point.
- d. Wire Tie to Metal Structural Member attachment:
  - 1) Wire wrapped to structural member with pigtail knot with three (3) tight wraps within 3 inch length at top connection.
- 4. Hanger Wires, Braces, and Ties:
  - Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
  - b. Size:
    - 1) Standard size: 12 gauge (0.105 inch) () galvanized, soft annealed steel wire.
    - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire, but provide not less than 12 gauge (0.105 inch) ().
  - c. Protect with rust inhibitive paint.
- 5. Seismic Joint Clip:
  - a. Required for Seismic Design Categories D, E and F.
    - 1) Quality Standard Product:
      - a) SJCG by Armstrong.
      - b) Equal as approved by Architect before bidding. See Section 01 6200.
- 6. Compression Posts/Struts:
  - a. Required for Seismic Design Categories D, E and F.
    - Meet seismic requirements for Project.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Inspect area receiving suspension system to identify conditions which will adversely affect installation.
    - a. Work trades work to be thoroughly dry and complete prior to installation.
    - b. Verify weather tightness of area to receive suspension system prior to installation.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install suspension system until adverse conditions have been remedied.

### 3.2 INSTALLATION

- A. Interface With Other Work:
  - 1. All work above ceiling should be completed prior to installing suspended ceiling system including related work including: drywall furring work, acoustical tile, light fixtures, mechanical systems, electrical systems, and sprinklers.
- B. General:
  - Install suspension system in accordance with Manufacturer's written instructions, and in compliance with ASTM
    installation standard, and applicable codes as required by AHJ with modifications listed below except where
    Manufacturer's instructions are more stringent:
    - a. Main runners/tees hanger wires 48 inches on center maximum.
    - b. Cross runners/tees hanger wires 24 inches on center maximum.
    - c. Do not kink, twist, or bend hanger wires as a means of leveling assembly.
    - d. Do not attach suspension system to adjustable folding partition headers.
  - 2. Hanger Wires:
    - a. Install hanger wire to structure as required with necessary on center spacing to support expected ceiling load requirements, following local practices, codes and regulations. Attach with pigtail knot with three (3) tight wraps within 3 inch length at each end.
    - b. Provide additional wires at light fixtures, grilles, and access doors where necessary by appropriate method in accordance with industry accepted practice.

c. Additional Hanger Wires: Wrapped tightly three (3) full turns within 3 inch length to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span.

### C. Seismic:

- 1. Required for Seismic Design Categories D, E and F:
  - a. Installation must be in accordance with ASCE 7.

### D. Tolerances:

- 1. Main Runners/Tees:
  - a. Installed and leveled to meet IBC requirements to within 1/4 inch in 10 foot with supporting wire taut to prevent any subsequent downward movement of main runners when ceiling loads are imposed.
- 2. Cross Runners/Tees:
  - a. Main runners, or other cross runners, must support cross runners to within 1/32 inch of required center-tocenter spacing. This tolerance must be noncumulative beyond 12 feet.
  - b. Intersecting runners must be installed to form right angle to supporting members.

### 3.3 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. Inspect:
    - a. Suspended ceiling system.
    - b. Hanger wires, braces, ties, anchors and fasteners.
- B. Non-Conforming Work:
  - 1. Remove and replace defective materials at no additional cost to Owner.

END OF SECTION

### SECTION 09 2900 GYPSUM BOARD

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install gypsum board as described in Contract Documents, except behind ceramic tile.
  - 2. Furnish and install backerboard for ceramic tile as described in Contract Documents.
  - 3. Furnish and install acoustical sealants as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustical sealants.
  - 2. Section 09 2216: 'Non-Structural Metal Framing'.
  - 3. Section 09 3013: 'Ceramic Tile' for installation of backerboard joint reinforcing.
  - 4. Section 09 9413: 'Interior Textured Finishing'.

### 1.2 REFERENCES

#### A. Definitions:

- Accessories: Metal or plastic beads, trim, or moulding used to protect or conceal corners, edges, or abutments of the gypsum board construction.
- 2. Drywall Primer: Paint material specifically formulated to fill the pores and equalize the suction difference between gypsum board surface paper and the compound used on finished joints, angles, fastener heads, and accessories and over skim coatings.
- 3. Skim Coat: Either a thin coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, over the entire surface.
- 4. Texturing: Regular or irregular patterns typically produced by applying a mixture of joint compound and water, or proprietary texture materials including latex base texture paint, to a gypsum board surface previously coated with drywall primer.

### B. Reference Standards:

- 1. ASTM International:
  - a. ASTM C11-16, 'Standard Terminology Relating to Gypsum and Related Building Materials and Systems'.
  - b. ASTM C475/C475M-15, 'Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board'
  - c. ASTM C840-17, 'Standard Specification for Application and Finishing of Gypsum Board'.
  - d. ASTM C1002-16, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs'.
  - ASTM C1047-14a, 'Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base'.
  - f. ASTM C1178/C1178M-13, 'Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel'.
  - g. ASTM C1396/C1396M-14a, 'Standard Specification for Gypsum Board'.
  - h. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - ASTM E119-16a, 'Standard Test Method for Fire Tests of Building Construction and Materials'.
- 2. Gypsum Association:
  - a. GA-214-15, 'Recommended Levels of Gypsum Board Finish'.
  - b. GA-216-16: 'Application and Finishing of Gypsum Panel Products'.
  - c. GA-600-15, 'Fire Reference Design Manual'.
  - GA-801-07, 'Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors'.
- 3. International Building Code (IBC) (2015 or latest approved version):
  - a. Chapter 25, 'Gypsum Board And Plaster'.

- 4. National Building Code of Canada / Underwriters Laboratories of Canada:
  - a. CAN/ULC-S102: 'Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies' (7th Edition).
- 5. Underwriters Laboratories, Inc.
  - a. UL 263: 'Test Method for Fire Tests of Building Construction and Materials' (14th Edition).
  - b. UL 723: 'Test for Surface Burning Characteristics of Building Materials; (10th Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Schedule MANDATORY pre-installation conference immediately before installation of gypsum wallboard.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of ceramic tile backerboard.

### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - Fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. General:
  - 1. Following recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- B. Delivery And Acceptance Requirements:
  - Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- C. Storage And Handling Requirements:
  - 1. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
    - a. Do not install interior products until installation areas are enclosed and conditioned.
      - 1) Temperature shall be 50 deg F and 95 deg F maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
      - 2) Provide ventilation to eliminate excessive moisture.
      - 3) Avoid hot air drafts that will cause too rapid drying.
    - b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

#### PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Manufacturers:

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- 1. Manufacturer Contact List:
  - a. American Gypsum, Dallas, TX www.americangypsum.com.
  - b. CertainTeed Gypsum, Inc; Tampa, FL www.certainteed.com.
  - c. Georgia Pacific, Atlanta, GA www.gp.com.
  - d. National Gypsum, Charlotte, NC www.nationalgypsum.com.
  - e. Pabco Gypsum, Newark, CA www.pabcogypsum.com.
  - f. United States Gypsum Co, Chicago, IL www.usg.com.

#### B. Materials:

- 1. Interior Gypsum Board:
  - a. General:
    - 1) Size:
      - Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
    - 2) Class Two Quality Standard:
      - a) Core: Fire-resistant rated gypsum core.
      - b) Complies with Type X requirements of ASTM C1396/C1396M (Section 5).
      - c) Surface paper: Face paper suitable for painting.
      - d) Long edges: Tapered edge.
      - e) Overall thickness: 5/8 inch.
- 2. Glass Mat Gypsum Tile Backer:
  - a. Product meeting requirements of ASTM C1178/C1178M.
  - b. 5/8 inch.
  - c. Square edges.
  - d. Category Four Approved Manufacturer. See Section 01 6200 for definitions of Categories:
    - 1) DensShield Tile Backer by Georgia Pacific.
    - 2) GlasRoc Tilebacker by CertainTeed.

### 2.2 ACCESSORIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Magnum Products, Lenaxa, KS www.levelcoat.com.
    - b. National Gypsum, Charlotte, NC www.nationalgypsum.com.
    - c. Soundproofing Co, San Marcos, CA www.soundproofing.org.
    - d. United States Gypsum Co, Chicago, IL www.usg.com.
    - e. Westpac Materials Inc, Orange, CA www.westpacmaterials.com.
    - f. Wm. Zinsser & Co, Somerset, NJ www.zinsser.com.
  - 2. Gypsum Board Mounting Accessories:
    - a. Furring Channels:
      - 1) Class Two Quality Standards. See Section 01 6200 for definitions:
        - Walls: Galvanized DWFC-25.
      - 2) Accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
    - b. Corner And Edge Trim:
      - Metal, paper-faced metal, paper-faced plastic, or solid vinyl meeting requirements of ASTM C1047.
         Surfaces to receive bedding cement treated for maximum bonding.
    - c. Control Joint:
      - Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
  - 3. Joint Compound:
    - Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.
      - 1) Use Taping Compound for first coat to embed tape and accessories.
      - 2) Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
      - 3) Use Finishing Compound for final coat and for skim coat.
  - Joint Reinforcing:
    - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
  - 5. Fasteners:
    - a. Bugle head screws meeting requirements of ASTM C1002:
      - 1) Gypsum Board:

- Type W: For fastening gypsum board to wood members, of length to penetrate wood framing 5/8 inch minimum.
- b) Type S: For fastening gypsum board to steel framing and ceiling suspension members, of length to penetrate steel framing 3/8 inch minimum.
- 2) Glass Mat Gypsum Tile Backer:
  - a) Wood Framing: 11 ga (0.1233 in galvanized with 7/16 inchhead, hot dipped. Screws: Type W or Type S Hi-Lo, bugle head, rust resistant.
- B. Primer / Surfacer On Surfaces To Receive Texturing:
  - 1. Type Two Acceptable Products:
    - a. Sheetrock First Coat by USG.
    - b. Prep Coat by Westpac Materials.
    - c. Level Coat by Magnum Products.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Primer On Surfaces To Receive Wallcovering:
  - 1. White, self-sizing, water based, all purpose wallcovering primer.
  - 2. Type Two Acceptable Products:
    - a. Shieldz Universal Pre-Wallcovering Primer by Wm. Zinsser and Company.
    - b. Equal as approved by Architect before application. See Section 01 6200.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify framing is suitable for installation of gypsum board.
  - 2. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
  - 3. Notify Architect of unsuitable conditions in writing.
    - a. Do not install board over unsuitable conditions.
  - 4. Commencement of Work by installer is considered acceptance of substrate.

### 3.2 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
  - 2. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Interior Gypsum Board:
  - 1. General:
    - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over 1/8 inch wide before taping are acceptable.
    - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
    - c. On walls over 108 inches high, apply board perpendicular to support
    - d. Butt edges in moderate contact. Do not force in place. Shim to level.
    - e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
    - f. Scribe work closely:
      - 1) Keep joints as far from openings as possible.
      - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
      - 3) No vertical joints shall occur within 8 inches of external corners or openings.
    - g. Install board tight against support with joints even and true. Tighten loose screws.
    - h. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.
  - 2. Ceilings:

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- a. Apply ceilings first using minimum of two (2) men.
- b. Use board of length to give minimum number of joints.
- c. Apply board perpendicular to support.
- d. Chapel and Cultural Hall:
  - 1) Double Layer Application:
    - a) Apply base layer:
      - (1) End and edge joints of board applied on ceilings do not need to be back blocked in field area of ceiling.
      - (2) Edge joints of board vertically applied on walls shall occur over framing members.
      - (3) 2x4 blocking is required at wall to ceiling transitions and at top of ceiling vault transitions.
    - b) Apply face layer with joints staggered in relationship to base and occurring over supports:
      - Use combination of adhesive and screws if required to meet Manufacturer's specifications for fire-rated assembly.
      - (2) Apply screws attaching face layer through base layer into support for specified penetration.

### 3. Fastening:

- a. Apply from center of board towards ends and edges.
- b. Apply screws 3/8 inch minimum from ends and edges, one inch maximum from edges, and 1/2 inch maximum from ends.
- c. Spacing:
  - 1) Ends: Screws not over 7 inches on center at edges where blocking or framing occurs.
  - 2) Wood Framed Walls And Ceilings: Screws 7 inches on center in panel field.
  - 3) Metal Framed Walls: Screws 12 inches on center in panel field.
- d. Set screw heads 1/32 inch below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches away.
- e. Screws on adjacent ends or edges shall be opposite each other.
- f. Drive screws with shank perpendicular to face of board

### 4. Trim:

- a. Corner Beads:
  - 1) Attach corner beads to outside corners.
    - Attach metal corner bead with staples spaced 4 inches on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
    - b) Set paper-faced trim in solid bed of taping compound.
- b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames 1/8 inch to allow for caulking.

### 5. Finishing:

- a. General:
  - Tape and finish joints and corners throughout building as specified below to correspond with final
    finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face
    paper or paper-faced trim.
  - 2) First Coat:
    - a) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
    - b) Completely fill gouges, dents, and fastener dimples.
    - c) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
  - 3) Second Coat:
    - a) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
    - b) Re-coat gouges, dents, and fastener dimples.
    - c) Allow to dry and sand lightly to eliminate high spots or excessive compound.
  - 4) Third Coat: Apply same as second coat except extend application 6 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
  - 5) Fourth Coat: Apply same as second coat except extend application 9 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
- a. Finishing Levels: Finish panels to levels indicated below and according to ASTM C840, GA-214 and GA-216:
  - 1) Gypsum Board Surfaces not painted or finished:
    - a) GA-214 Level 1: 'All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable'.

- 2) Gypsum Board Surfaces Under Acoustical Tile:
  - a) GA-214 Level 2: 'All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
  - Note: It is critical that gypsum board ceiling be smooth before installing ceiling tile. Drywall joints must be as specified in paragraph above.
- 3) Gypsum Board Surfaces to Receive: Wall Covering Type A Section 09 7226: 'Sisal Wall Covering':
  - a) GA-214 Level 3: 'All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified wall covering primer'.
- 4) Gypsum Board Surfaces to Receive: Acoustic Wall Fabric Type B Section 09 7216, 'Vinyl-Coated Fabric Wall Covering':
  - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
- 5) Gypsum Board Surfaces to Receive: Painted Texturing Section 09 9413: 'Interior Textured Finishing':
  - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
- 6) Gypsum Board Surfaces to Receive: Smooth Gypsum Board Surfaces:
  - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
- D. Glass Mat Gypsum Tile Backer:
  - 1. Apply glass mat gypsum tile backer to framing. Attach using specified fasteners spaced 6 inches on center on edges and into all framing members. Drive screws flush with surface of board.
  - 2. Shim board to be plumb and flat or level and flat, depending on location.
  - 3. Apply reinforcing only at joints where abutting different materials.

### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Works
  - 1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
    - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
    - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### 3.4 CLEANING

A. Remove from site debris resulting from work of this Section including taping compound spills.

### END OF SECTION

GYPSUM BOARD - 6 - 09 2900

### SECTION 09 3013 CERAMIC TILING

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install ceramic tile and tile setting materials and accessories as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for installation of backerboard behind ceramic tile, except for joint reinforcing.
  - 2. Section 22 1319: 'Facility Sanitary Sewer Specialties' for floor drains installed in ceramic tile floors.
- C. Products Installed But not Furnished Under This Section:
  - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants'.

### 1.2 REFERENCES

- A. Association Publications:
  - 1. American National Standard Specification (ANSI) for the Installation of Ceramic Tile.
  - 2. International Standards Organization (ISO) 13007, 'Classification for Adhesives and Grout'.
  - 3. Tile Council of North America:
    - a. TCNA Handbook, 'Handbook for Ceramic, Glass, and Stone Tile Installation, 2015'.
- B. Definitions:
  - Crack Isolation: Prevention of transfer of cracks from substrate through tile or stone when substrate is subjected to horizontal movement of cracks.
  - 2. Dynamic Coefficient of Friction (DCOF): Measures ratio of forces necessary to keep two surfaces sliding.
  - 3. Epoxy Grout: Mortar system employing epoxy resin and epoxy hardener portions.
  - 4. Grout: Rich or strong cementitious or chemically setting mix used for filling tile joints.
  - 5. ISO 13007 Standards Product Classifications:
    - a. Adhesives:

Types	Classes	Special Characteristics
C = Cementitious	1 = Normal	F = Fast-Setting
(Thin-Set Mortars)	2 = Improved	T = Slip-Resistant
		E = Extended Open Time
		S1 = Deformable
		S2 = Highly Deformable
		P1 = Plywood Adhesion
		P2 = Improved Plywood Adhesion
D = Dispersion	1 = Normal	F = Fast-Setting
(Mastics)	2 = Improved	T = Slip-Resistant
		E = Extended Open Time
R = Reaction Resin	1 = Normal	T = Slip-Resistant
(Epoxies)	2 = Improved	

- 1) Cementitious Adhesive (C): Mixture of hydraulic binding agents (e.g. portland cement), aggregates, and organic additives (e.g. latex polymers, moisture retention additive, etc...) to be mixed with water or latex admix before mixing.
- 2) Dispersion Adhesive (D): Ready-to-use mixture of organic binding agents in the form of an aqueous polymer dispersion, organic additives and mineral fillers mastic type products.
- 3) Reaction Resin Adhesive (R): Single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction epoxy or urethane based products.
- 4) Class 1 (1): Adhesive has passed minimum pass level tests that are mandatory for that adhesive type.
- 5) Class 2 (2): Adhesive has passed same tests as Class 1 and/or other applicable tests, but at higher pass levels.
- 6) Fast-Setting (F): Adhesive with accelerated cure time that must achieve minimum strength requirements of fast setting adhesive. This designation does not apply to reaction resin adhesives (R).
- 7) Slip-Resistance (T): Downward movement of a tile applied to combed adhesive layer on vertical surface must be ≤ 0.5mm for a C or D adhesive, and ≤ 5mm for a type R adhesive.
- 8) Extended Open Time (E): Maximum time interval after application at which tiles can be embedded in applied adhesive and meet tensile adhesion strength requirement must be ≥ 30 minutes. This designation does not apply to reaction resin adhesives (R).
- 9) Deformability (S): Capacity of hardened adhesive to be deformed by stresses between tile and substrate without damage to installed surface to pass S1 requirements an adhesive must be able to deform ≥ 2.5mm but < 5mm; to pass S2 requirements an adhesive must be able to deform ≥ 5mm. This designation does not apply to reaction resin adhesives (R).
- Exterior Glue Plywood (P): Adhesive with ability to bond tile or stone to exterior glue plywood substrates (interior only). This designation does not apply to reaction resin adhesives (R) or dispersion adhesives (D).

#### b. Grouts:

.5.		
Types	Classes	Special Characteristics
CG = Cementitious Grout	1 = Normal	F = Fast-Setting
	2 = Improved	A = High Abrasion Resistance
		W = Reduced Water Absorption
RG = Reaction Resin Grouts	1 = Normal	Higher performance characteristics
	2 = Improved	than improved cementitious grouts

- 1) Cementitious Grout (CG): Mixture of hydraulic binding agents (e.g. portland cement), aggregates, inorganic and organic additives (e.g. latex polymers, moisture retention additive, etc...).
- 2) Reaction Resin Grout (RG): Single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction epoxy or urethane based products.
- 3) Class 1 (1): Grout has passed minimum pass level tests that are mandatory for cementitious grouts.
- 4) Class 2 (2): Cementitious grout has passed same tests as Class 1 and/or other applicable tests, but at higher pass levels.
- 5) Fast-Setting (F): Grout with accelerated cure time that must achieve minimum compressive strength requirements under normal conditions within twenty four (24) hours. This designation applies only to cementitious grouts (CG).
- 6) High Abrasion Resistance (A): Capability of grout to resist wear. This designation applies only to cementitious grouts (CG).
- 7) Reduced Water Absorption (W): Grout has lower water absorption rate than standard cementitious grout. This designation applies only to cementitious grouts (CG).
- 6. Latex/Polymer Modified Portland Cement Mortar: Latex/Polymer modified portland cement mortar is a mixture of portland cement, sand, and special latex/polymer additive that is used as a bond coat for setting tile.
- 7. Pavers: Unglazed porcelain or natural clay tile formed by dust-pressed method and similar to ceramic mosaics in composition and physical properties but relatively thicker with 6 inch or more of facial area. (ASTM C242).
- 8. Sanded Cement Grout: Factory prepared mixture of cement, graded sand, and other ingredients to produce water-resistant, dense, uniformly colored material. Used for joints of 1/8 inch width or greater.
- 9. Static Coefficient of Friction (SCOF): Measures ratio of forces necessary to start two surfaces sliding (older measurement of friction replaced by dynamic coefficient of friction (DCOF)).
- 10. Unsanded Cement Grout: Factory prepared mixture of cement and additives that provide water retentivity. Used for joints of 1/8 inch or less.

#### C. Reference Standard:

- 1. American National Standards Institute:
  - a. ANSI A108/A118/A136.1, 'American National Standards Specifications for the Installation of Ceramic Tile', Version 2013.1 (compilation of standards):

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- 1) Installation Standards:
  - a) A108.01, 'General Requirements: Subsurfaces and Preparation by Other Trades'.
  - b) A108.02, 'General Requirements: Materials, Environmental, and Workmanship'.
  - c) A108.05, 'Installation of Ceramic Tile with Dry-Set Portland Cement Mortar of Latex-Portland Cement Mortar'.
  - A108.6, 'Installation of Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy'.
  - e) A108.10, 'Installation of Grout in Tilework'.
  - f) A108.17, 'Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone'.
- 2) Material Specifications:
  - a) A118.1, 'Dry-Set Portland Cement Mortar'.
  - b) A118.3. 'Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive'.
  - c) A118.4, 'Latex Portland Cement Mortar'.
  - d) A118.6, 'Cement Grouts for Tile Installation'.
  - e) A118.7, 'High-Performance Polymer Modified Latex/Portland Cement Grouts for Tile Installation'.
  - f) A118.10, 'Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations'.
  - g) A118.12, 'Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installations'.
- o. ANSI A137.1, 'National Standard Specifications for Ceramic Tile'.
- 2. ASTM International:
  - a. ASTM A1064/A1064M-17, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
  - b. ASTM C144-11, 'Standard Specification for Aggregate for Masonry Mortar'.
  - c. ASTM C150/C150M-17, 'Standard Specification for Portland Cement'.
  - d. ASTM C206-14, 'Standard Specification for Finishing Hydrated Lime'.
  - e. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
  - f. ASTM C242-15, 'Standard Terminology of Ceramic Whitewares and Related Products'.
  - g. ASTM C373-16, 'Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products'.
  - h. ASTM C482--02(2014), 'Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste'.
  - ASTM C501-84(2015), 'Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser'.
  - ASTM C648-04(2014), 'Standard Test Method for Breaking Strength of Ceramic Tile'.
  - k. ASTM C847-14a, 'Standard Specification for Metal Lath'.
- 3. International Organization for Standardization:
  - a. ISO 13007-1-2013, 'Ceramic tiles Grouts and adhesives Part 1: Terms, definitions and specifications for adhesives'.
  - b. ISO 13007-2-2013, 'Ceramic tiles Grouts and adhesives Part 2: Test methods for adhesives'.
  - c. ISO 13007-3-2013, 'Ceramic tiles Grouts and adhesives Part 3: Terms, definitions and specifications for
  - d. ISO 13007-4-2013, 'Ceramic tiles Grouts and adhesives Part 4: Test methods for grouts'.
- 4. Tile Council of North America:
  - a. TCNA B415-15, 'Wood or Metal Studs, Mortar Bed Walls, Mortar Bed Floor, Ceramic Tile'.
  - b. TCNA F111-15, 'On-Ground or Above-Ground Concrete, Unbonded Mortar Bed, Ceramic Tile'.
  - c. TCNA F115-15, 'On-Ground Concrete, Ceramic Tile, Epoxy or Furan Grout'.
  - d. TCNA W244c-15, 'Wood or Metal Studs, Cement Backer Board, Ceramic Tile'.
  - e. TCNA W245-15, 'Wood or Metal Studs, Coated Glass Mat Water-Resistant Gypsum Backer Board, Ceramic Tile'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review installation scheduling, coordination with related work, and placement of tile.
    - b. Review Manufacturer's installation requirements, submittals, and Installers requirements to assure issuance of Manufacturer's system warranty.
    - c. Review surface preparation.

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- d. Review water-proofing and crack isolation membrane requirements.
- e. Review tile base installation requirements.
- f. Review floor tile grout thickness requirements.

### 1.4 SUBMITTALS

- A. Action Submittals:
  - Samples:
    - a. 24 inch square sample on specified tile backer showing all types of tile, grout, and colors specified in this Section. 1/2 of sample board shall show floor tile, 1/4 shall show font tile, and 1/4 shall show wall tile.
    - b. One sample of each type of base tile and trim piece to be used on Project.
- B. Informational Submittals:
  - Certificates:
    - a. Master grade certificate.
      - 1) Conform to ANSI A137.1.
  - 2. Manufacturer's Instructions:
    - a. Provide instructions for installation of tile-setting materials.
  - 3. Source Quality Control Submittals:
    - Provide Manufacturer documentation indicating proposed materials will satisfy requirements for Manufacturer's Warranty.
  - 4. Qualification Statement. See Section 01 4301 for qualifications:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Cleaning and maintenance instructions.
    - b. Warranty Documentation:
      - 1) Include copy of final, executed warranty.
    - c. Record Documentation:
      - 1) Manufacturers Documentation:
        - Source Quality Control Submittal documentation showing materials will satisfy requirements for Manufacturer's Warranty.
        - b) Manufacturer's cut sheets of materials used in installed system.
        - c) Tile color and pattern selections.

### 1.5 QUALITY ASSURANCE

- A. Source Of Materials:
  - 1. Provide materials obtained from one (1) source for each type and color of tile, grout, and setting materials for Manufacture's system warranty.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum three (3) years' experience installing specified tile installations.
    - b. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
    - c. Upon request, submit documentation.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver and store packaged materials in their original unopened containers with labels intact until time of use.
- B. Storage and Handling Requirements:
  - 1. Store and handle materials in a manner to prevent damage or contamination by water, freezing, or foreign matter.
  - 2. Keep grade seals intact and cartons dry until tile are used.

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### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not apply tile setting materials to surfaces that contain frost.
  - 2. Keep ambient temperatures of area to receive tile work and surface temperatures of substrates at 50 deg F minimum during preparation of mortar bed, laying of tile, and for seventy-two (72) hours after completion of tile work. Use electric heat to prevent discoloration of grout.
  - 3. Temperature of substrate shall be 60 deg F and rising for application of epoxy and furan unless otherwise specifically authorized by Manufacturer.
  - 4. Maintain epoxy at stable temperature between 60 deg F and 90 deg F during curing period.

### 1.8 WARRANTY

- A. Manufacturer Warranty:
  - Mortar Manufacturer's twenty-five (25) year minimum system warranty on tile-setting materials for surface
    preparation, setting materials and grouting materials; includes replacement of defective materials and
    deterioration, including replacement of tile and labor and materials when products purchased are used within
    their shelf life and installed in accordance to Manufacturers written instructions and industry standard guidelines.

### PART 2 - PRODUCTS

### 2.1 SYSTEMS

A. Manufacturers:

C.

- Manufacturer's Contact List:
  - a. Ardex Engineered Cements, Aliquippa, PA www.ArdexAmericas.com.
    - 1) Contact Information: Don Richards (206) 979-0401 www.Don.richards@ArdexAmericas.com.
  - b. Custom Building Products, Seal Beach, CA www.custombuildingproducts.com.
    - 1) Contact Information: John Gallup (206) 718-6024 johng@cbpmail.net.
    - Dal-Tile Corp., Div. of Mohawk Industries, Dallas, TX www.daltile.com.
  - d. Interceramic Inc., Garland, TX www.interceramic.com.
  - e. Laticrete International Inc., Bethany, CT www.laticrete.com.
  - f. Mapei Americas Headquarters, Deerfield Beach, FL www.mapei.com.
    - 1) Contact Information: Bart A. Wilde (801) 467-2060 www.bwilde@mapei.com.
  - g. Merkrete, by Parex USA, Inc., Anaheim, CA www.merkrete.com.
    - 1) Contact Information: Andy Townes (505) 873-1181 andy.townes@parexusa.com.
  - h. Schulter Systems L.P., Plattsburgh, NY www.schluter.com.
- B. Category Two National Contract Suppliers. See Section 01 6200 for definitions of Categories:
  - 1. Contact following suppliers to procure components of tile assembly:
    - a. Daltile And Stone, Salt Lake City, UT:
      - 1) LDS Project Coordinators:
        - a) Russ Green and Larry McCleary, (801) 487-9901, cell (801) 301 1461, fax (801) 487-0345 larry.mccleary@daltile.com www.daltileproducts.com or www.daltilegreenworks.com.
    - b. Interceramic:
      - 1) LDS Project Coordinators:
        - a) First Contact: Diego Chavez, phone (214) 503-5433, fax (877) 551-1979 dichavez@interceramic.com.
        - Second Contact: Jose Valdez, phone (214) 503-5507, fax (877) 551-1979 ivaldez@interceramic.com.
- C. Design Criteria:
  - 1. General:
    - a. Paver Tile: Standard grade porcelain tile, solid color throughout, graded in accordance with ANSI A137.1:
      - 1) Cove Base with external and internal corner pieces shall be standard grade.
    - b. Ceramic Tile:
      - Tile shall be standard quality, white or off-white body, square or cushion edge, graded in accordance with ANSI A137.1.

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- 2) Square edge, white body, lug type wall tile. Field wall tile shall have two lugs on each edge to assure uniform joint, approximately 0.040 inch.
- 3) External and internal corner pieces shall be standard grade.
- c. Font Floor And Font Stair Treads: Porcelain mosaic tile with non-slip, non-abrasive surface.
- 2. Capabilities:
  - a. Paver Tile:
    - 1) Water Absorption when tested in accordance with ASTM C373: 0.1 to 0.5 percent.
    - 2) Abrasive Wear Resistance when tested in accordance with ASTM C501: 275 minimum.
    - 3) Breaking Strength when tested in accordance with ASTM C648: 300 lbs minimum.
    - 4) Bond Strength when tested in accordance with ASTM C482: 200 psi minimum.
    - 5) Coefficient of Friction: 0.42 minimum as measured by DCOF (Dynamic Coefficient of Friction) AcuTest method and requirements as per ANSI A137.1.

### D. Description:

- L. Paver Tile:
  - a. Tile Sizes:
    - 1) Finished floor with no slope shown on Contract Documents: 12 inches square minimum:
      - a) Cove Base: External and internal corner pieces to match with bull-nosed top:
        - (1) 6 inches by 12 inches.
        - (2) 6 inches by 8 inches.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Daltile.
        - (2) Interceramic.
    - 2) Finished floor with slope shown on Contract Documents: 8 inches square:
      - a) Cove Base: External and internal corner pieces to match with bull-nosed top:
        - (1) 6 inches by 8 inches.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Daltile.
  - b. Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
    - 1) CD05 Bianco Alpi by Daltile.
    - 2) Dotti Ivory by Interceramic.
- 2. Ceramic Tile:
  - a. Font Floor Tile And Font Stair Treads:
    - 1) Tile Size: 2 inch square nominal.
    - 2) Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
      - a) Floors And Stair Treads:
        - (1) D037 Pepper White by DalTile.
        - (2) Dotti Ivory by Interceramic.
      - Font Stair Risers And Safety Strips:
        - (1) D169 Waterfall by Daltile.
        - (2) Uni, Blue by Interceramic.
  - b. Font Wall Tile:
    - 1) Walls: 6 inch by 6 inch
    - 2) Ceramic Tile Base:
      - a) 6 inch high, A3602 bullnose base.
    - 3) Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
      - a) Font Walls:
        - (1) 0100 White by Daltile.
        - (2) Bone by Interceramic.
  - c. Wall Tile:
    - 1) Walls: 6 inch by 6 inch
    - 2) Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
      - a) Room Walls:
        - (1) 0135 Almond by Daltile.
        - (2) Canvas by Interceramic.
      - b) Accent Color:
        - (1) 0100 White by Daltile.
        - (2) Bone by Interceramic.

### E. Materials:

- 1. Paver Tile:
  - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:

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- 1) Porcealto Graniti by Daltile.
- 2) Intertech Unglazed by Interceramic.
- 2. Wall Tile:
  - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - 1) Semi-Gloss or Matte by Dal-Tile.
    - 2) IC Brites or Mattes or Bold Tones Series by Interceramics.
- Font Floor Tile:
  - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - Porcelain mosaic floor tile by Daltile.
    - 2) Porcelain mosaic floor tile by Interceramic.
- 4. Mortar Bed:
  - a. Portland Cement: Meet requirements of ASTM C150/C150M, Type 1, designation shall appear on bag.
  - b. Hydrated Lime:
    - 1) Meet Requirements of one of following:
      - a) ASTM C206.
      - b) ASTM C207, Type S (designation shall appear on bag).
  - c. Sand: Clean, washed, well-graded, meeting requirements of ASTM C144 with gradation of 100 percent passing No. 8 sieve with not over five (5) percent passing No. 100 sieve.
  - d. Latex Additive; in lieu of all water:
    - 1) Design Criteria:
      - a) Meet material specification requirements of ANSI A118.4 or ANSI 118.11.
      - Meet ANSI installation specification requirements of ANSI A108.5.
      - c) Expansion joints complies with TCA method EJ171.
    - 2) Type Two Acceptable Products:
      - a) ARDEX: Ardex E 90 Mortar Admix.
      - b) CUSTOM: Thin-Set Mortar Admix.
      - c) LATICRETE: 4237 Latex Additive with 211 Powder.
      - d) MAPEI: Planicrete AC.
      - e) MERKRETE: 150 Latex Admixture.
- 5. Metal Trim:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Tile / Carpet Junction: Schluter-RENO-AETK.
- 6. Joint Sealants:
  - a. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
    - 1) Ceramic and paver cove base inside corners.
    - 2) Ceramic and paver tile joints.
    - 3) Termination joints in fonts.
- 7. Backer Board Joint Reinforcing: 2 inch wide glass fiber mesh tape.
- 8. Tile Setting Products:
  - a. Use only products of same Manufacturer to validate warranty, unless otherwise acceptable to Ceramic Tile Supplier.
  - b. Use only products that meet Mortar Manufacturer's twenty five (25) year system warranty requirements.
  - c. Latex-Portland Cement Mortar For Floors:
    - Design Criteria:
      - a) Meet ANSI material specification requirements of ANSI 118.4, ANSI 118.11, or ANSI A118.15.
      - b) Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and C2ES1P2 performance requirements for adhesive.
    - 2) Category Four Approved Products. See Section 01 62 00 for definitions of Categories:
      - a) ARDEX: Ardex X77.
      - b) CUSTOM: Megalite Crack Prevention Mortar or FlexBond Premium Crack Prevention Thin-set Mortar (no additives needed).
      - c) LATICRETE: 254 Platinum Thinset.
      - d) MAPEI: Ultraflex 3.
      - e) MERKRETE: 735 Premium Flex.
  - d. Latex/Polymer Modified Portland Cement Mortar For Walls:
    - 1) Design Criteria:
      - a) Meet ANSI material specification requirements of ANSI 118.4, ANSI 118.11, or ANSI A118.15.
      - Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and C2ES1P2 performance requirements for adhesive.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

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- a) ARDEX: Ardex X77.
- b) CUSTOM: Megalite Thin-Set Mortar or FlexBond Fortified Thin-Set Mortar.
- c) LATICRETE: 254 Platinum Thinset.
- d) MAPEI: Ultraflex 3.
- e) MERKRETE: 735 Premium Flex.
- e. Floor Grout (Epoxy):
  - Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI 118.3.
    - Meet ANSI installation specification requirements of ANSI A108.6 and ISO material specification ISO13007 RG.
  - 2) Approved Color:
    - a) ARDEX: 25 Stormy Mist.
    - b) CUSTOM: No. 145 Light Smoke.
    - c) LATICRETE: No. 24 Natural Grey.
    - d) MAPEI: No. 11 Sahara Beige.
    - e) MERKRETE: Pro Epoxy D-153 Buckskin.
  - 3) Approved Color (Font Floor only):
    - a) ARDEX: No. 19 Silver Shimmer.
    - b) CUSTOM: No. 165 Delorean Gray.
    - c) LATICRETE: No. 78 Sterling Silver.
    - d) MAPEI: No. 27 Silver.
    - e) MERKRETE: Pro Epoxy D-34 River Rock.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) ARDEX: Ardex WA.
    - b) CUSTOM: CEG-Lite 100% Solids Commercial Epoxy Grout.
    - c) LATICRETE: SpectraLOCK PRO.
    - d) MAPEI: Kerapoxy (sanded).
    - e) MERKRETE: Pro Epoxy.
- f. Wall Grout (Modified Polymer):
  - 1) Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI A118.6 or ANSI A118.7.
    - Meet ANSI installation specification requirements of ANSI 108.10 or ISO material specification ISO13007 C2ES1P2.
  - 2) Color:
    - a) ARDEX: No. 01 Polar White.
    - b) CUSTOM: No. 381 Bright White.
    - c) LATICRETE: No. 44 Bright White.
    - d) MAPEI: No. 00 White.
    - e) MERKRETE: D-11 Snow White.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) ARDEX: Ardex FH.
    - b) CUSTOM: PolyBlend Non-Sanded Grout or Prism Color Consistent Grout.
    - c) LATICRETE: 1600 Series Unsanded Dry Set Wall Grout with 1776 Grout Admix Plus additive.
    - d) MAPEI: Keracolor-U Unsanded Polymer-Modified Grout.
    - e) MERKRETE: Non-Sanded ColorGrout, latex modified.
- g. Waterproofing Membrane:
  - 1) Design Criteria:
    - a) Meet ANSI installation specification requirements of ANSI 108.10.
    - a) ANSI installation specification requirements not required.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions for Categories:
    - a) Troweled applied, cement based:
      - (1) ARDEX: Ardex 8+9.
      - (2) MAPEI: Mapelastic 315.
    - b) Liquid applied, latex based:
      - (1) CUSTOM: RedGard Waterproofing or Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
      - (2) LATICRETE: Hydro Ban.
      - (3) MAPEI: Mapelastic AquaDefense.
      - (4) MERKRETE: Hydro-Guard SP-1.
- h. Crack Isolation Membrane:
  - Design Criteria:
    - a) Meet ANSI installation specification requirements of ANSI 118.12.
    - b) ANSI installation specification requirements not required.

- 2) Category Four Approved Products. See Section 01 6200 for definitions for Categories:
  - a) Flexible, thin, load-bearing, fabric-reinforced:
    - (1) ARDEX: Ardex 8+9 with SK Mesh Tape.
    - (2) CUSTOM: Crack Buster Pro Crack Prevention Mat Underlayment, with Peel & Stick Primer
    - (3) LATICRETE: Blue 92 Anti-Fracture Membrane.
    - (4) MAPEI: Mapeguard 2, and Primer SM.
    - (5) MERKRETE: Hydro-Guard SP-1.
  - b) Liquid applied, latex based:
    - (1) CUSTOM: RedGard Waterproofing and Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
    - (2) LATICRETE: Hydro Ban.
    - (3) MAPEI: Mapelastic AquaDefense.
    - (4) MERKRETE: Fracture Guard 5000.
- i. Stone Thresholds:
  - 1) Texture and color variation shall be within limits established by Architect's approved sample.
  - 2) Free of defects that would materially impair strength, durability, and appearance.
  - 3) Finish: 80 grit exterior hone.
  - 4) White marble, one (1) piece, 7/8 inch thick by 2 1/2 inches by door opening width. Cross-section to meet handicap accessibility requirements.

### F. Mixes:

### 1. Mortar Beds:

	Portland Cement	Dry Sand	Damp Sand	Hydrated Lime*
Floor Mix	One Part	5 Parts	4 Part	1/10 Part
Wall Mix	One Part		5-1/2 to 7 Parts	1/2 Part
Font	One Part **		4 Part	

Optional

#### PART 3 - EXECUTION:

### 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrates where tile will be installed for compliance with requirements for installation tolerances and other conditions effecting performance of installed tile.
  - 2. Verify tile substrate is well cured, dry, clean, and free from oil or waxy films, and curing compounds.
  - 3. Notify Architect in writing if surfaces are not acceptable to install tile:
    - a. Do not lay tile over unsuitable surface.
    - b. Commencing installation constitutes acceptance of surfaces and approval of existing conditions.

### 3.3 PREPARATION

- A. Surface Preparation:
  - 1. Allow concrete to cure for twenty-eight (28) days minimum before application of mortar bed.
  - 2. Repair and clean substrate in accordance with installation standards and manufacturer's instructions.

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<sup>\*\*</sup> Use waterproofing admixture. Mix dry then add minimum amount of water.

### 3.4 INSTALLATION

### A. Interface With Other Work:

1. Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.

### B. Special Techniques:

- 1. Install in accordance with following latest TCNA installation methods:
  - a. Flush Concrete Slabs with crack isolation membrane: TCNA F115.
  - b. Mortar Bed on Concrete Slab: TCNA F111 with reinforcing.
  - c. Font: TCNA B414 with waterproof membrane.
  - d. Framed Walls: TCNA W245 with waterproof membrane.
  - e. Tile Cove Base: TCNA Flush style.

#### C. Tolerances:

- Plane of Vertical Surfaces:
  - a. 1/8 inch in 8 feet from required plane shall be plumb and true with square corners.
- 2. Variation In Slab Grade:
  - a. Plus or minus 1/8 inch in any 10 feet of floor slab and distance between high point and low point of slab of 1/2 inch.
  - b. Slab Testing Procedure:
    - 1) Place ends of straightedge on 3/8 inch high shims.
    - 2) Floor is satisfactory if 1/4 inch diameter steel rod rolled under straightedge will not touch anywhere along 10 foot length and 1/2 inch diameter steel rod will not fit under straightedge anywhere along 10 foot length.

### D. General:

- 1. Install tile in pattern indicated:
  - a. Align joints when adjoining tiles on floor, base, walls, and trim are same size.
  - b. Adjust to minimize tile cutting and to avoid tile less than half size.
  - c. Center and balance areas of tile if possible.
- 2. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption:
- 3. Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in feet and inches and are not required to fill vertical spaces exactly.
- 4. Install cut tile with cuts on outer edges of field:
  - a. Provide straight cuts that align with adjacent materials.
  - b. When possible, smooth cut edges of tile or use appropriate cutter or wet saw to produce smooth cuts.
  - c. Do not install tile with jagged or flaked edges.
- 5. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment:
  - a. Fit tile closely where edges are to be covered by trim, escutcheons, or similar devices.
- 6. Provide straight tile joints of uniform width, subject to variance in tolerance allowed in tile size:
  - a. Make joints smooth and even, without voids, cracks, or excess mortar or grout.
- 7. Use a beating block and hammer or rubber mallet so faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.
- 8. Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection.
- 9. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

### E. Application On Concrete Floor:

- 1. On Mortar Bed:
  - a. Apply mortar bed to depth equal to depression in slab minus 1/2 inch.
  - b. Properly cure before installing tile.
- 2. Clean substrate surface thoroughly.
  - a. Dampen if very dry, but do not saturate.
- 3. Install tile with 100 percent contact with mortar bed.
  - a. Obtaining 100 percent contact may require troweling mortar layer on back of each tile before placing on mortar bed.
- 4. Install base by flush method (square or thin-lip method is not acceptable):
  - a. Allow for expansion joint directly above any expansion or control joints in slab.
- 5. Insert temporary filler in expansion joints.

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### F. Application Of Mortar:

- 1. Do not spread more mortar than can be covered within ten (10) to fifteen (15) minutes:
  - a. If 'skinning' occurs, remove mortar and spread fresh material.
  - Spread mortar with notches running in one (1) direction, perpendicular to pressing, pushing and pulling of tile during placement.
- 2. Install tile before mortar has started initial cure:
  - a. For thin set mortar application, use notch trowel that will achieve the recommended coverage of mortar after tiles have been installed.
- 3. Place tile in fresh mortar, press, push and pull tile slightly to achieve as near 100 percent coverage and contact of tile with setting material and substrate as possible:
  - a. Average contact area shall be not less than eighty (80) percent except on exterior or shower installations where contact area shall be ninety-five (95) percent when not less than three (3) tiles or tile assemblies are removed for inspection. The eighty (80) percent or ninety-five (95) percent coverage shall be sufficiently distributed to give full support of the tile.
  - b. Support corners and edges with mortar leaving no hollow corners or edges.
- 4. Install so there is 1/8 inch of mortar between tile and substrate after proper bedding:
  - Periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
  - b. If coverage is found to be insufficient, use a larger size notch trowel.

### G. Application Of Grout:

- 1. Firmly set tile before applying grout:
  - a. This requires forty-eight (48) hours minimum.
- 2. Before grouting:
  - a. Remove all paper and glue from face of mounted tile.
  - b. Remove spacers or ropes before applying grouting:
- 3. Mixing Grout:
  - a. Use clean buckets and mixing tools:
    - 1) Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.
  - b. Machine mixing of grout is preferred to assure uniform blend. To prevent trapping air bubbles into prepared grout, use slow speed mixer.
  - c. Slake for fifteen (15) minutes.
  - d. Water or latex additives used for mixing with dry grout shall be measured accurately.
- 4. Before grouting entire area, do a test area to assure there will be no permanent staining or discoloration of tile and to verify that excess grout can be easily removed from tile surface:
  - a. If necessary, pre-coat exposed surfaces of tile with a grout release recommended by Grout Manufacturer to facilitate removal of excess grout.
- 5. Installing Grout:
  - a. Use caution, when grouting glazed ceramic tiles to prevent scratching or damaging surface of tile.
  - b. Dampen dry joints prior to grouting with sand-portland cement grout, standard sanded cement grout, standard unsanded cement grout, polymer modified sanded tile grout, and polymer modified unsanded tile grout. Do not leave puddles of water in joints before grouting.
  - c. Keep an adequate joint depth open for grouting. Force maximum amount of grout into joints.
  - d. Apply grout to produce full, smooth grout joints of uniform width, and free of voids and gaps
    - 1) Fill joints of cushion edge tile to depth of cushion.
    - 2) Fill joints of square edge tile flush with surface.
    - 3) Fill joint between wall tile and bull-nosed paver tile base with floor grout.
  - e. Install floor tile with grout thickness of 3/16 inch maximum.
  - f. Remove excess grout from surface of tile before it loses its plasticity or begins to set.
  - g. Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots.

### H. Curing:

- 1. Keep installation at 65 to 85 deg F during first eight (8) hours of cure. Shade area completely from sun during this period.
- I. Application of Joint Sealants:
  - 1. Apply joint sealants after grout has cured:
    - a. This requires forty-eight (48) hours minimum.
  - 2. Before applying sealant:
    - a. Remove spacers or ropes before applying joint sealants.
    - b. Apply backer rod and joint sealants at expansion joints.

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### 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - Correct any work found cracked, chipped, broken, unbounded and otherwise defective or not complying with contract document requirements at no additional cost to the Owner.

### 3.6 CLEANING

- A. If one has been used, remove grout release and clean tile surfaces so they are free of grout residue and foreign matter:
  - 1. If a grout haze or residue remains, use a suitable grout haze remover or cleaner.
  - 2. Flush surface with clean water before and after cleaning.

### 3.7 PROTECTION

- A. Close to traffic areas where tile is being set and other tile work being done:
  - 1. Keep closed until tile is firmly set.
  - 2. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and airflow that will interfere with setting and curing of grout.
- B. Newly tiled floors shall not be walked on nor worked on without using kneeling boards or equivalent protection of tiled surface.
- C. After cleaning, provide protective covering and maintain conditions protecting tile work from damage and deterioration:
  - 1. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, cover protective covering with 1/4 inch hardboard, plywood, or similar material.

END OF SECTION

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### SECTION 09 5113 ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install acoustical ceiling panels for suspended acoustical ceilings as described in Contract Documents
- B. Related Requirements:
  - 1. Section 09 5323: 'Metal Acoustical Suspension Assemblies'.
  - 2. Section 26 5100: 'Interior Lighting' for light fixtures.
  - 3. Division 23: Related sections for HVAC installed in ceiling.

### 1.2 REFERENCES

- A. Association Publications:
  - 1. The Ceilings & Interior Systems Construction Association (CISCA), *Ceiling Systems Handbook*. 405 Illinois Avenue, 2B, St Charles IL. www.cisca.org.
    - a. Recommendations for direct hung acoustical tile and lay-in panel ceilings.

#### B. Definitions:

- 1. Acoustical Panel: Form of a prefabricated sound absorbing ceiling element used with exposed suspension systems.
- 2. Absorption: Materials that have capacity to absorb sound. Absorption is the opposite of reflection.
- 3. Ceiling Attenuation Class (CAC): Rates ceiling's efficiency as barrier to airborne sound transmission between adjacent closed offices. Shown as minimum value, previously expressed as CSTC (Ceiling Sound Transmission Class). Single-figure rating derived from normalized ceiling attenuation values in accordance with classification ASTM E413, except that resultant rating shall be designated ceiling attenuation class. (Defined in ASTM E1414.) Acoustical unit with high CAC may have low NRC.
- 4. Center Line: Line indicating midpoint of surface in either direction. Used as guide in starting ceiling.
- 5. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
- 6. Flame Spread: The propagation of flame over a surface.
- 7. Flame Spread Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.
- 8. Interior Finish: Interior finish includes interior wall and ceiling finish and interior floor finish.
- 9. Mineral Base: Ceilings composed principally of mineral materials such as fibers manufactured from rock or slab, with or without binders.
- 10. Noise Reduction Coefficient (NRC): Average sound absorption coefficient measured at four frequencies: 250, 500, 1,000 and 2,000 Hertz expressed to the nearest integral multiple of 0.05. Rates ability of ceiling or wall panel or other construction to absorb sound. NRC is fraction of sound energy, averaged over all angles of direction and from low to high sound frequencies that is absorbed and not reflected.
- 11. Reflection Factor: Percentage of light a surface reflects.
- 12. Reveal Edge: Acoustical lay-in panels with step-down edge are intended for use in direct hung exposed suspension systems.
- 13. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723
- 14. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with CAN/ULC-S102.2.
- 15. Sound Absorption: Property possessed by materials and objects, including air, of converting sound energy into heat energy. Sound wave reflected by surface always loses part of its energy. Fraction of energy that is not reflected is called sound absorption coefficient of reflecting surface. For instance, if material reflects 80 percent of sound energy, then sound absorption coefficient would be 20 percent (0.20).
- 16. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.

17. Textured Pattern: Granular or raised (fine, coarse, or a blend), felted or matted surface as an integral part of the basic product or superimposed on the product surface.

### C. Reference Standards:

- 1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (AASHRA):
  - a. ASHRAE Standard 62.1-2013, 'Ventilation for Acceptable Indoor Air Quality'.
- ASTM International:
  - a. ASTM C423-17, 'Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method'.
  - b. ASTM D3273-16, 'Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber'.
  - c. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - d. ASTM E119-16a, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
  - e. ASTM E1111/E1111M-14, 'Standard Test Method for Measuring the Interzone Attenuation of Open Office Components'.
  - f. ASTM E1264-14, 'Standard Classification for Acoustical Ceiling Products'.
  - g. ASTM E1414/E1414M-16, 'Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum'.
  - h. ASTM E1477 98a(2013), 'Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers'.
- 3. International Building Code (IBC) (2015 or latest approved Edition):
  - a. Chapter 8, 'Interior Finishes':
    - 1) Section 803, 'Wall And Ceiling Finishes':
      - a) 803.1.1, 'Interior Wall and Ceiling Finish Materials'.
      - b) 803.1.2, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
- 4. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2015 edition).
  - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls', (2015 edition).
- 5. Underwriters Laboratories Inc.:
  - a. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials; Tenth Edition September 10 2008'. (Revision: September 13, 2010).

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Produce Data: Technical data for each type of acoustical ceiling unit required.
  - 2. Sample: Minimum 6 inch x 6 inch samples of specified acoustical panel.
- B. Informational Submittals:
  - Certificates
    - a. Manufacturer's certifications that products comply with specified requirements including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry approved independent laboratory classification of NRC, CAC, and AC.
  - 2. Test And Evaluation Reports:
    - If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - Manufacturers Documentation:
        - a) Manufacturer's literature.
        - b) Color and pattern selection.
- D. Maintenance Material Submittals:
  - Extra Stock Materials:
    - a. Provide Owner with one (1) carton of each type of tile for future use.
      - 1) Packaged with protective covering for storage and identified with appropriate labels.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  - Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
    - Room Corner Tests:
      - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.2.1, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 3) NFPA 265: 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 4) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
  - 2. Store in cool, dry location, out of direct sunlight and weather, and at temperatures between 32 deg F and 86 deg F
  - 3. Handle acoustical ceiling panels carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
  - Installation shall be at temperatures between 32 deg F and 86 deg F (30 deg C) or as per Manufacturer recommendations.

### 1.7 WARRANTY

- A. Manufacturer's Warranty:
  - 1. Acoustical ceiling panels:
    - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
    - b. Manufacturer's warranty against sagging and warping.
    - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers Contact List:
  - 1. Armstrong World Industries, Lancaster, PA www.ceilings.com.
    - a. Contact Information:
      - For pricing and ordering of tile, contact Sherry Brunt / Phyllis Miller at (800) 442-4212, FAX 800-233-5598, or bpo\_strategic\_accounts@armstrong.com.
      - 2) For Strategic Account information, contact Randy Lay at (303) 775-1409 ralay@armstrong.com.

2. USG Interiors Inc, Chicago, IL www.usg.com.

### 2.2 MATERIALS

- A. Acoustic Ceiling Panels:
  - a. Description:
  - b. Color: White (surface factory-applied).
  - c. Composition: Wet-formed mineral fiber.
  - 2. Design Criteria:
    - a. Acoustics:
      - 1) Noise Reduction Coefficient (NRC): ASTM C423; 0.70 minimum.
      - 2) Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; 35 minimum.
    - b. Antimicrobial Protection: Resistance against growth of mold/mildew.
    - c. Classification:
      - Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 1 (nodular) or Form 4 (cast or molded), Pattern E1 (lightly textured).
    - d. Fire Performance: As specified in Quality Assurance in Part 1 of this specification.
    - e. Light Reflectance (LR): ASTM E1477; 0.83 minimum.
    - f. Sag Resistance: Resistance to sagging in high humidity conditions.
    - g. VOC: Low.
  - 3. Wide Face Design:
    - a. Design Criteria:
      - 1) Grid Face: 15/16 inch.
      - 2) Size: 24 inch x 24 inch x 7/8".
    - b. Type One Acceptable Products. See Section 01 6200:
      - 1) Fine Fissured item 1713 by Armstrong:
        - a) Grid System: Prelude XL Exposed Tee.
        - b) Edge Profile: Square Lay-in.
      - 2) Radar ClimaPlus Open Plan item 22320 by USG:
        - a) Grid System: DX/DXL Exposed Tee.
        - b) Edge Profile: Square.
      - 3) Equal as approved by Architect before bidding. See Section 01 6200.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Inspect for defects in support that are not acceptable.
    - a. All wet work (concrete, painting, and etc.) must be completed and dry.
    - b. Temperature conditions within Manufacturer's written recommendation.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install acoustical ceiling panels until defects in support or environmental conditions are corrected.

### 3.2 PREPARATION

- A. Materials shall be dry and clean at time of application.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

### 3.3 INSTALLATION

A. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

### B. Special Techniques:

- 1. If recommended by Manufacturer, use tile one at a time from at least four (4) open boxes to avoid creating any pattern due to slight variations from box to box. Use tile from same color run in individual rooms to assure color match.
- 2. Leave tile in true plane with straight, even joints.

### 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Remove and replace defective materials at no additional cost to Owner including, but not limited to following:
    - a. Remove and replace damaged or broken acoustical ceiling panels.
    - b. Remove and replace discolored acoustical ceiling panels to match adjacent.
    - c. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

### 3.5 CLEANING

- A. Clean exposed surfaces of acoustical ceiling panels, including trim, edge moldings, and suspension members.
  - 1. Comply with Manufacturer's written instructions for cleaning and touch up of minor finish damage.
- B. Waste Management:
  - 1. Remove from site all debris connected with work of this Section.

END OF SECTION

# SECTION 09 5116 ACOUSTICAL TILE CEILINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install acoustical tile on backerboard as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2226: 'Metal Suspension System' for Gypsum Board.
  - 2. Section 09 2900: 'Gypsum Board'.

#### 1.2 REFERENCES

- A. Association Publications:
  - The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. www.cisca.org.
    - a. 'Ceiling Systems Handbook': Recommendations for direct hung acoustical tile installation.
    - o. 'Production Guide': Practical reference for ceiling systems and estimating costs.

#### B. Definitions:

- 1. Absorption: Materials that have capacity to absorb sound. Absorption is the opposite of reflection.
- 2. Ceiling Attenuation Class (CAC): Rates ceiling's efficiency as barrier to airborne sound transmission between adjacent closed offices. Shown as minimum value, previously expressed as CSTC (Ceiling Sound Transmission Class). Single-figure rating derived from normalized ceiling attenuation values in accordance with classification ASTM E413, except that resultant rating shall be designated ceiling attenuation class. (Defined in ASTM E1414.) Acoustical unit with high CAC may have low NRC.
- 3. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
- 4. Flame Spread: The propagation of flame over a surface.
- 5. Flame Spread Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.
- 6. Light Reflectance (LR): Percentage of light a surface reflected by ceiling surface expressed in decimal form.
- 7. Noise Reduction Coefficient (NRC): Average sound absorption coefficient measured at four frequencies: 250, 500, 1,000 and 2,000 Hertz expressed to the nearest integral multiple of 0.05. Rates ability of ceiling or wall panel or other construction to absorb sound. NRC is fraction of sound energy, averaged over all angles of direction and from low to high sound frequencies that is absorbed and not reflected.
- 8. Smoke-Developed Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.
- 9. Sound Absorption: Property possessed by materials and objects, including air, of converting sound energy into heat energy. Sound wave reflected by surface always loses part of its energy. Fraction of energy that is not reflected is called sound absorption coefficient of reflecting surface. For instance, if material reflects 80 percent of sound energy, then sound absorption coefficient would be 20 percent (0.20).
- 10. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
- 11. Textured Pattern: Granular or raised (fine, coarse, or a blend), felted or matted surface as an integral part of the basic product or superimposed on the product surface.

#### C. Reference Standards:

- 1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (AASHRA):
  - a. ASHRAE Standard 62.1-2013, 'Ventilation for Acceptable Indoor Air Quality'.
- ASTM International;
  - a. ASTM D1779-98(2011), 'Standard Specification for Adhesive for Acoustical Materials'.
  - b. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - c. ASTM E795-16, 'Standard Practices for Mounting Test Specimens During Sound Absorption Tests'.
  - d. ASTM E1264-14, 'Standard Classification for Acoustical Ceiling Products'.

- e. ASTM E1414/E1414-16, 'Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum'.
- f. ASTM E1477 98a(2013), 'Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers'.
- 3. International Building Code (IBC) (2015 or latest approved Edition:
  - a. Chapter 8, 'Interior Finishes':
    - Section 803, 'Wall And Ceiling Finishes':
      - a) 803.1.1, 'Interior Wall and Ceiling Finish Materials'.
      - b) 803.1.2, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
- 4. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2015 Edition).
  - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls' (2015 Edition).
- 5. Underwriters Laboratories Inc.:
  - a. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (Tenth Edition).

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference specified in Section 09 2900 to review finish requirements for gypsum wallboard ceilings.
  - 2. Schedule acoustical tile ceiling pre-installation conference after installation of gypsum wallboard but before beginning installation of tile.
  - 3. In addition to items specified in Section 01 3100, review following:
    - a. Verify that tile comes from same dye lot and has same dye lot code.
    - b. Review requirements of acceptable and non acceptable tile.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. One (1) sample of each variant of specified tile series.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Installer(s):
      - Provide each Installer's 'Certificate of Completion LDS Duratile' from Manufacture showing Name and completion date with bid to be included in closing documents for project.
        - a) Certificate is valid for two (2) years from date printed on Certificate before recertification is required.
  - 2. Test And Evaluation Reports:
    - If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
  - 3. Manufacturer Installations:
    - a. Published installation recommendations.
  - 4. Qualification Statement:
    - a. Installer(s):
      - 1) Provide Qualification documentation unless waived by Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include final, executed copy of warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature on tile and adhesive.
        - b) Color and pattern selection.
      - 2) Installer(s) 'Certificate of Completion LDS Duratile' submitted at time of bid.

- D. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Provide Owner with six (6) cartons of each type of tile with same dye lot code.

# 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
    - a. Room Corner Tests:
      - ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.2.1, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 3) NFPA 265: 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 4) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.

#### B. Qualifications:

- 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
  - a. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity including a minimum of three (3) years of experience in glue-up ceiling tile installations and shall have satisfactorily completed glue-up installation(s) within in past three (3) years before bidding.
  - b. Review, understand, and comply Installer Qualifications and submitted 'DuraTile' published installation recommendations provided by Manufacturer:
    - Contact Armstrong CSA customer service center at (800) 442-4212 to obtain and review compliance package on DuraTile prior to bidding.
    - 2) This requirement may be waived by Owner, if Installer has previously complied with Installer Qualification requirements and can document at least two (2) satisfactorily completed projects of comparable size using Armstrong 12 inch x 12 inch (300 mm x 300 mm) ceiling tile for glue-up within past three (3) years prior to bidding.
    - 3) Installer shall note complete compliance with Qualification requirements on submitted bid form.
    - 4) Submit qualification documentation unless waived by Owner.
  - c. Agree to complete and pass 'LDS Duratile Personal Learning Module' (Certificate required for all Installer(s) for Church projects). Certification valid for two (2) years:
    - 1) Go to http://www.armstrongceilings.learnupon.com/users/sign\_in.
    - 2) If you are new to site, contact Callyn Paul: e-mail: capaul@armstrongceiling.com, phone (717) 396-2220 to set up a username and password.
    - 3) Click on Dashboard in Upper Right hand Corner and select Catalog.
    - 4) Under Filter Catalog Category (left hand side) click on Personal Leaning Module (PLM).
    - 5) Click ENROLL on the LDS Duratile Course.
    - 6) Once enrolled, click START on the course to begin.
    - 7) Watch video and take 10 guestion Quiz then print out completion certificate.
    - 8) Certificate must be submitted with Bid.
    - 9) Certificate required for all projects and may not be waived by Owner.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
  - 2. Store acoustic tile in cool, dry location, out of direct sunlight and weather, and at temperatures between 32 deg F and 86 deg F.
  - 3. Store adhesive on site at installation temperature, between 65 and 90 deg F, for one week before installation.

4. Handle acoustical ceiling tiles carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

# 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
  - 2. Temperature at time of setting tile shall be 50 deg F minimum and 100 deg F maximum.

# 1.8 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide Manufacturer's ten (10) year limited system warranty for the following:
    - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
    - b. Manufacturer's warranty against sagging and warping.
    - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Armstrong World Industries, Strategic Accounts, Lancaster, PA www.armstrongceilings.com.
      - 1) For pricing and ordering of tile, contact Sherry Brunt or Beth Rinehart at (800) 442-4212, or Armstrongcsa@armstrongceilings.com.
      - For Strategic Account information, contact Deborah Pickens at (480) 695-9053 dlpickens@armstrongceilings.com.
    - b. Franklin International, Inc., Columbus, OH www.titebond.com.
- B. Materials:
  - a. Description:
  - b. Size:3/4 inch thick minimum by 12 inches square.
  - c. Color: White.
  - d. Grid Face: Tile glue-up.
  - e. Surface Finish: Factory-applied.
  - f. Wet-formed high density mineral fiber.
  - 2. Design Criteria:
    - a. Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 2 (water felted), Pattern CE (perforated, small holes lightly textured), Fire Class A.
    - b. Acoustics:
      - 1) Noise Reduction Coefficient (Rating expressed according to ASTM E1284 requirements:
        - a) NRC rating: 60 minimum.
      - 2) CAC rating: 35 minimum.
    - c. Anti Mold / Mildew:
      - 1) Resistance against growth of mold/mildew.
    - d. Durable:
      - 1) Impact-resistant.
      - 2) Scratch-resistant.
    - e. Tongue and Groove.
    - f. Finish:
      - 1) Abuse-resistant/durable, factory applied vinyl latex paint.
    - g. Fire Performance:
      - 1) Panels meet ASTM E84 or UL 723 Type 1 surface burning characteristics.
    - h. High Recycled Content (HRC): Classified as containing greater than 50 percent total recycled content.
    - i. Light Reflectance (LR): 0.86 Average (Range of 0.84 to 0.88).

- j. Sag Resistance:
  - Resistance to sagging in high humidity conditions up to, but not including, standing water and outdoor applications.
- k. Texture: Embossed texture with fine fissuring and small perforations with natural variation in texture and color appearance between tile.
- I. VOC Emissions:
  - 1) Low formaldehyde: Contributing less than 13.5 ppb in typical conditions per ASHRAE Standard 62, 'Ventilation for Acceptable Indoor Air Quality'.
- Acoustic Tile:
  - a. Category Three National Account Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) DuraTile Item No. MN80377 by Armstrong.

#### C. Accessories:

- Adhesive:
  - a. Description:
    - 1) For use on acoustical ceiling tiles.
  - b. Design Criteria:
    - 1) Meet requirements of ASTM D1779.
    - 2) Meet NFPA Class A fire rating when tested in accordance with ASTM E84.
    - 3) Fast grab and 'no sag' installation.
    - 4) Water cleanup.
    - 5) Not recommended for use on tiles larger than 12 inch x 12 inch.
  - c. Type Two Acceptable Products:
    - 1) Titebond No. 2704 Solvent Free Acoustical Ceiling Tile Adhesive by Franklin International.
    - Highest quality of adhesive from manufacturer recommended by Tile Manufacturer as approved by Architect before use. See Section 01 6200.
- 2. Edge Molding:
  - a. Steel 'U' molding with baked enamel finish.
  - b. Type Two Acceptable Products:
    - 1) 7843 Series by Armstrong.
    - 2) Equal as approved by Architect before installation. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Inspect for defects in backing and support that are not acceptable.
    - a. Examine areas around HVAC diffusers and light fixtures for tile installation problems.
    - b. Examine ceiling for levelness. CISCA 'Code of Practice' requires ceiling to be free of irregularities and be level to within 1/4 inch in 12 foot.
    - c. Examine substrate for any problems that will compromise adhesion of ceiling tile.
  - 2. Notify Architect in writing of unacceptable conditions.
  - 3. Do not apply ceiling tile until defects in backing and support are corrected.

# 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Follow Manufacturer recommendations for surface preparation:
    - a. Substrate must be clean, free of grease and dirt, sound, smooth, even and level before applying tile to surface.
    - b. Painted Surfaces: Avoid applying tile to newly painted ceiling.
    - c. Materials shall be dry and clean at time of application.

# 3.3 INSTALLATION

- A. Special Techniques:
  - 1. Installation shall be in accordance with Manufacturer's recommendations:

- a. Do not install tile when room temperature exceeds or below recommended ambient conditions.
- b. Tile is directional tile and must be installed in same direction of pattern running parallel to long dimension of each room.
- c. Remove loose dust from back of tile and ceiling where adhesive is to be applied.
- d. Prime 3 inch minimum circle near each corner by buttering very thin coat of adhesive.
- e. Apply daub of adhesive to each corner. Daubs will be of sufficient size to form a circle 2-1/2 to 3 inches in diameter and 1/8 to 1/4 inch thick when tile is pressed firmly in place. Do not apply daubs so far in advance of installation that adhesive skins over.
- f. Do not bend tile during installation.

#### Tile Layout:

- a. Lay out tile symmetrically about center lines of room.
- b. Lay out so tiles at room perimeters are at least 1/2 full tile size.
- c. Leave tile in true plane with straight, even joints.
- d. Tile joints shall be straight and in alignment, and exposed surface flush and level.
- e. Furnish and install specified molding wherever tile has exposed edges or abuts walls, columns, and other vertical surfaces, except at curves of 3 inch radius or smaller.
- f. Cut around penetrations that are not to receive moldings cleanly with sharp knife and at a slight angle away from cutout.
- 3. Ceiling mounted items:
  - a. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room and centered on tile centers or tile joints insofar as possible, unless shown otherwise.
  - b. Keep method of locating ceiling mounted items as consistent as possible throughout building.
  - c. Ceiling mounted item location method within each room shall always be consistent.

# 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Acoustical Tile. The following have been identified by the Manufacturer as tile defects, should not be installed, and will be replaced at no charge to Owner. Manufacturer will replace any material that does not meet product specifications. Installer to call 1 (800) 442-4212 immediately to report any tile discrepancies:
    - a. Obvious Tile Defects:
      - 1) Gross surface defects or damage.
      - 2) Gross damage to edges and corners.
      - 3) Bevels without paint.
    - b. Size Measurement:
      - 1) Tiles measure 12 inches, plus or minus 1/32 inch, measured across center of two (2) parallel sides.
    - c. Squareness Measurement:
      - 1) Measure two (2) diagonals of an individual ceiling tile.
      - 2) Diagonal measurements need to be within 1/16 inch of each other. No more than 1/16 inch difference.
    - d. Warp:
      - 1) Tiles specification is plus or minus 0.050 inch as measured in the center of tile.
  - 2. Installer:
    - Substrate preparation and installation of ceiling tile not following CISCA Code of Practice will be unacceptable and considered defective and subject to replacement at no cost to Owner.

#### 3.5 ADJUSTING

A. 'Touch-up' minor abraded surfaces.

# 3.6 CLEANING

A. Remove from site debris connected with work of this Section.

# END OF SECTION

# SECTION 09 5323 METAL ACOUSTICAL SUSPENSION ASSEMBLIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal acoustical suspension system as described in Contract Documents including:
    - a. Suspension system framing.
    - b. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

# B. Related Requirements:

- 1. Section 09 5113: 'Acoustical Panel Ceiling'.
- 2. Section 26 5100: 'Interior Lighting' for electrical fixtures installed in ceiling.
- 3. Division 21: 'Fire Suppression' for sprinklers installed in ceiling.
- 4. Division 23: 'Mechanical' for related sections for HVAC installed in ceiling.
- 5. Division 26: 'Electrical' for related electrical work.
- 6. Division 27: 'Communications' for related sound and video work.

# 1.2 REFERENCES

#### A. Association Publications:

- The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. www.cisca.org.
  - a. 'Ceiling Systems Handbook': Recommendations for direct hung acoustical tile and lay-in panel ceiling installation.
  - b. CISCA 0-2, 'Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (zones 0-2)' Covers Seismic Design Category C.
  - c. CISCA 3-4, *'Guidelines for Seismic Restraint for Direct*-hung Suspended Ceiling Assemblies (zones 3-4)' Covers Seismic Design Category D, E, and F.
  - d. 'Production Guide': Practical reference for ceiling systems and estimating costs.

## B. Definitions:

- 1. Ceiling Suspension System: System of metal members, designed to support a suspended ceiling, typically acoustical ceiling. Also may be designed to accommodate lighting fixtures or air diffusers.
- 2. Clips: Several clip designs are available to suit applications such as fire resistance, wind uplift and impact. Fire-resistance rated designs have exact requirements, including mandatory use of hold down clips for acoustical panels or tiles weighing less than 1 lb per sq ft. For rooms with significant air pressure differential from adjacent spaces, retention clips may be necessary to retain panels in place. Maintaining air pressure values may also require perimeter panel seals, typically closed cell foam gasket with adhesive on one side.
- 3. Compression Post (Vertical Strut, Seismic Struts): Rigid member used to provide lateral force bracing of suspension system.
- 4. Cross Runner, Cross Tee: Cross runner is secondary or cross beams of mechanical ceiling suspension system, usually supporting only acoustical tile. Cross tee is inserted into main runner to form different module sizes. In some suspension systems, however, cross runners also provide support for lighting fixtures, air diffusers and other cross runners.
- 5. Exposed Grid System: Structural suspension system for lay-in ceiling panels. Factory-painted supporting members are exposed to view. Exposed tee surfaces may be continuous or have integral reveal. Reveals are typically formed as channel or rail profiles extending down from tee leg.
- 6. Flange: Horizontal surface on face of tee, visible from below ceiling. Part of grid to which color cap is applied. Most grid system flanges are either 15/16 inch or 9/16 inch.
- 7. Hanger Wires: Wire employed to suspend acoustical ceiling from existing structure. Standard material is 12 gauge (0.105 inch -) galvanized, soft annealed steel wire, conforming to ASTM A641/A641M. Heavier gauge wire is available for higher load carrying installations, or situations where hanger wire spacing exceeds 4 feet on center. Seismic designs or exterior installations subject to wind uplift may require supplemental bracing or substantial hanger devices such as metal straps, rods or structural angles.

- 8. Heavy-Duty Systems: Primarily used for installations in which the quantities and weights of ceiling fixtures (lights, air diffusers, etc.) are greater than those for ordinary commercial structure.
- 9. Hold Down Clip: Mechanical fastener that snaps over bulb of grid system to hold ceiling panels in place.
- 10. Main Beam, Main Runner, Main Tee: Primary or main beams of type of ceiling suspension system in which structural members are mechanically locked together. Provide direct support for cross runners and may support lighting fixtures and air diffusers, as well as acoustical tile. Supported by hanger wires attached directly to existing structure; or installed perpendicular to carrying channels and supported by specially designed sheet metal or wire clips attached to carrying channels.
- 11. Splay Wires: Wires installed at angle rather than perpendicular to grid.
- 12. Stiffening Brace: Used to prevent uplift of grid caused by wind pressure in exterior applications.
- 13. Suspension System: Metal grid suspended from hanger rods or wires, consisting of main beams and cross tees, clips, splines and other hardware which supports lay-in acoustical panels or tiles. Completed ceiling forms barrier to sound, heat and fire. It also absorbs in-room sound and hides ductwork and wiring in plenum.
- 14. T-Bar: Any metal member of "T" cross section used in ceiling suspension systems.

# C. Reference Standards:

- 1. American Society of Civil Engineers/Structural Engineering Institute:
  - ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures' (Section 9, 'Earthquake Loads).
- ASTM International:
  - a. ASTM A568/A568M-15, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for'.
  - b. ASTM C635/C635M-13a, 'Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings'.
  - ASTM C636/C636M-13, 'Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels'.
  - d. ASTM A641/A641M-09a(2014), 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'
  - e. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - f. ASTM A1008/A1008M-15, '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'
  - g. ASTM B117-11, 'Standard Practice for Operating Salt Spray (Fog) Apparatus.
  - h. ASTM C635/C635M-13a, 'Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings'.
  - ASTM C636/C636M-13, 'Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels'.
  - j. ASTM D610-08(2012), 'Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces'.
  - k. ASTM E580/E580M-14, 'Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions'.
- 3. International Building Code (IBC) (2015 edition):
  - a. IBC 808.1.1.1, 'Suspended Acoustical Ceilings'.
- 4. International Code Council (ICC):
  - a. ICC/ESR-1222 (Reissued December 2013), 'USG Interiors, Inc'.
  - b. ICC/ESR-1308 (Reissued December 2014), 'Armstrong World Industries'.
- 5. Underwriters Laboratories / American National Standards Institute:
  - a. UL 263: 'Standard for Fire Test of Building Construction and Materials' (14th Edition).
  - b. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (10th Edition).

## 1.3 ADMINISTRATIVE REQUIREMENTS

## A. Coordination:

- 1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression systems.
- 2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

# 1.4 SUBMITTALS

- A. Action Submittals:
  - L. Product Data:

- Provide Manufacturer's technical literature on suspension system including listing dimensions, load carrying capacity and standard compliance.
- 2. Samples:
  - a. Minimum 8 inch long samples of exposed wall molding and suspension system, including main runner/tee and cross runner/tee with couplings.
- B. Informational Submittals:
  - Certificates:
    - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
    - b. Installer's certificates of training.
  - 2. Manufacturer's Instructions:
    - a. Manufacturer's details and installation instructions for seismic bracing. If requested, provide copy of code requirements applicable to Project.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. All system components conform to ASTM standards.
  - 2. Fire-Resistance Rating: UL approved metal suspension system.
  - 3. Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
  - 4. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand the effects of earthquake motions according to the following:
    - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
    - b. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's 'Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2 (Apply to Seismic Categories A & B).
    - c. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's 'Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4' (Apply to Seismic Categories C, D, E & F).
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Installer:
    - a. Installer training (Ceiling Masters training course or equivalent).
  - 2. Manufacturer:
    - a. Manufacturer in good standing of CISCA (Ceiling and Interior Systems Construction Association).

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
  - 2. Store material in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and general damage.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Suspension system: Manufacturer warranty including repair or replacement of rusting as defined by ASTM D610 and defects in material or factory workmanship.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
- B. Materials:
  - 1. Grid:
    - Systems shall meet requirements of ASTM C635/C635M, Heavy Duty suspension system required for Seismic Design Categories D, E, or F.
    - b. Exposed surfaces shall be finished with factory-applied white baked enamel.
    - c. Meet requirements of ASTM D610 for red rust.
    - d. Main runners and cross tees:
      - 1) All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A653/A653M. Main beams and cross tees are double-web steel construction with type exposed flange design.
      - 2) Wide-face design main runners and cross tees shall have one inch (25 mm) exposed face.
  - 2. Performance Standards:
    - a. DXL Systems by USG Interiors required for Seismic Design Categories D, E, or F.
  - 3. Wire Hangers, Braces, and Ties:
    - Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
    - b. Size:
      - 1) Standard size: 12 gauge (0.105 inch galvanized, soft annealed steel wire.
      - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire but provide not less than 12 gauge (0.105 inch.
    - c. Protect with rust inhibitive paint.
  - 4. Wall Molding: Channel section of cold-rolled electro-galvanized steel.
  - 5. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of same width as exposed runner.
  - 6. Hold-down Clips: As required by UL to prevent lifting of panels under unusual draft conditions.
  - 7. Seismic Joint Clip:
    - a. Required for Seismic Design Categories D, E, or F.
    - b. Quality Standard Product:
      - 1) SJCG by Armstrong World Industries, Lancaster, PA www.armstrong.com.
      - 2) Equal as approved by Architect before bidding. See Section 01 6200.
  - 8. Seismic Suspension System:
    - a. Required for Seismic Design Categories A, B, C, D, E, or F:
    - b. Design Criteria:
      - Installation of ceiling system must be as prescribed by ICC-ES Evaluation Reports ESR-1222 or ESR-1308 and applicable code.
      - 2) Meet requirements of ASTM A568/A568M for hot-dipped galvanized, cold-rolled steel.
      - 3) Attach cross runners to wall with seismic clips.
    - c. Wall Molding Size: 7/8 inch for all seismic design categories (code approved).
    - d. Category Four Acceptable Products. See Section 01 6200 for definition of Categories.
      - 1) ACM7 Clip by USG Inc, Chicago, IL www.usg.com.
      - 2) BERC-2 Clip by Armstrong World Industries, Lancaster, PA www.ceilings.com.
  - 9. Compression Posts/Struts:
    - a. Required for Seismic Design Categories D, E, or F.
    - b. Meet seismic requirements for Project.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Inspect area receiving suspension system to identify conditions which will adversely affect installation.

- a. Work trades work to be thoroughly dry and complete prior to installation.
- b. Verify weather tightness of area to receive suspension system prior to installation.
- 2. Notify Architect of unsuitable conditions in writing.
  - a. Do not install ceiling panels until adverse conditions have been remedied.

# 3.2 INSTALLATION

- A. Interface With Other Work:
  - All work above ceiling should be completed prior to installing suspended ceiling system including related work including: drywall furring work, acoustical tile, light fixtures, mechanical systems, electrical systems, and sprinklers.
- B. General:
  - 1. Install suspension system and panels in accordance with Manufacturer's written instructions, and in compliance with ASTM C636/C636M, and with authorities having jurisdiction (AHJ).
- C. Lay out suspension system symmetrically about center lines of room unless shown otherwise by Contract Drawings. Lay out system so use of tiles less than 1/2 size is minimized.
- D. Suspend main runner/tee from overhead construction with hanger wires spaced 4 feet on center along length of main runner/tee. Install hanger wires plumb and straight. Hanger wires shall not be installed in convenience holes.
- E. Maintain suspension system in true plane with straight, even joints.
- F. Suspension system joints shall be straight and in alignment, and exposed surface flush and level. Wherever system abuts walls, columns, and other vertical surfaces, furnish and install appropriate molding.
- G. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- H. Support edges with wall moldings.
- I. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room insofar as possible (unless shown otherwise). Locate fixtures, speakers, diffusers, and grilles within suspension grid spaces and centered at least one (1) direction within grid. Installed fixtures shall not compromise ceiling performance.
- J. Pay particular attention to required hanger wire placement and fixture protection. Individual component deflection not to exceed 1/360 of span.
- K. Nails installed vertically into bottom of structural members, which are subject to pullout, shall not be used to support metal acoustical suspended assemblies:
  - 1. Nails may be used when installed horizontally into sides of structural members.
  - 2. Embedment must be at least 5/8 inch.
- L. Screws, eyebolts or lag bolts used to support metal acoustical suspended assemblies must have minimum embedment of 5/8 inch when installed into structural members.

#### 3.3 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. Inspect:
    - a. Suspended ceiling system.
    - b. Hangers, anchors and fasteners.
- B. Non-Conforming Work:
  - Correct any work found defective or not complying with contract document requirements at no additional cost to Owner

# END OF SECTION

# SECTION 09 6466 WOOD ATHLETIC FLOORING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Wood Athletic Flooring:
    - Furnish and install hardwood floors complete with base, thresholds, and other items specified as described in Contract Documents.
    - b. Prepare and finish hardwood flooring system as described in Contract Documents.
    - c. Owner Furnished Testing Agency will test Alkalinity and Concrete Moisture of concrete slab before Pre-Installation Conference as specified in Section 09 0503 'Floor Substrate Preparation'.
- B. Products Installed But Not Furnished Under This Section.
  - 1. Volleyball Floor Plates.
- C. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary'.
  - Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
    - a. Provision of acceptable concrete substrate.
    - b. Installation of volleyball anchor sleeve.
  - 4. Section 07 2616: 'Below-Grade Vapor Retarders' for installation of below grade vapor retarder.
  - 5. Section 09 0503: 'Floor Substrate Preparation' for:
    - a. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
    - b. Floor substrate preparation.
    - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring'.
  - 6. Section 11 6625: 'Volleyball Equipment' for furnishing of volleyball floor anchors.

# 1.2 REFERENCES

- A. Association Publications:
  - American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
    - a. ACI 302.2R-06, *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (August 15, 2006).
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.
    - ASTM F2170-16b, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
    - c. ASTM F2420-05(2011), 'Standard Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate completion of flooring installation with other trades.
- B. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6466 pre-installation conference.

- 2. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
- Schedule conference after substrate preparation and ONE (1) week minimum before installation of flooring system.
- 4. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
  - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab:
    - 1) Follow Testing Agency report regarding Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
  - b. Review schedule for installation of wood athletic flooring and coordination with other trades.
  - c. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
  - d. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and flooring installation.

## C. Scheduling:

- Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
- Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Wood Athletic Flooring:
      - 1) Manufacturer's literature or cut sheet for flooring system and for finish system.
      - 2) Maintenance instructions.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Wood Athletic Flooring:
      - 1) Published installation instructions. Submit before pre-installation conference.
      - 2) Manufacture's installation verification requirements and schedule.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature.
      - 2) Testing Inspection Reports:
        - a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture tests.

#### 1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
  - 1. Owner will provide Testing for Alkalinity and Concrete Moisture of concrete slab before installation of flooring:
    - a. See Section 01 1200: 'Multiple Contract Summary'.
    - b. See Section 09 0503: 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.
- B. Qualifications: Section 01 4301 applies, but is not limited to following:
  - 1. Installer Qualifications:
    - a. Paint Installer:
      - 1) As recommended by Floor Finish Manufacturer.
    - o. Wood Athletic Flooring Installer:
      - 1) Qualified and approved by Manufacturer.
  - 2. Manufacturer Qualifications:
    - a. Not less than five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

- b. VMR Approved Manufacturers:
  - 1) Approval subject to VMR agreement process approval.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Wood Athletic Flooring:
    - a. Do not deliver wood materials to Project until interior painting and tile work is completed but before preinstallation conference.
- B. Storage And Handling Requirements:
  - 1. Wood Athletic Flooring:
    - a. Store wood materials on premises in area with environmental conditions as specified in Field Conditions to allow acclimation to moisture content that will prevail under environmental conditions under which building will be operated.
    - b. Pile bundled wood materials loosely to allow uniform acclimation.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Building Conditions:
    - a. Conditions inside building shall be brought to levels to be normal at occupancy of building.
    - b. Maintain these conditions from time flooring material is delivered to site to time Certificate of Substantial Completion is signed.
    - c. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
  - 2. Concrete Slab:
    - a. General:
      - 1) Final determination as to whether or not a concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing as specified in Section 09 0503 'Floor Substrate Preparation'.
    - b. Alkalinity:
      - Do not install wood flooring if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
    - c. Concrete Moisture Vapor Emission Rate (MVER):
      - Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
      - Follow requirements specified in Section 09 0503 'Floor Substrate Preparation' before installation of wood flooring.

#### 1.8 WARRANTY

- A. Manufacturer Warranty:
  - Wood Athletic Flooring:
    - a. Flooring Company's two year written guarantee covering labor and materials:
      - Follow Manufacturer's verification procedures of installation conditions necessary for issuance of warranty.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Manufacturer:
  - 1. Category One VMR Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Duracushion by Connor Sports Flooring Corp, Phoenix, AZ Jon Isaacs (800) 283-9522 FAX 847-290-9034, e-mail jisaacs@connorfloor.com..

b. Bio-Cushion by Robbins Sports Surfaces, Cincinnati, OH Todd Goodridge (800) 543 1913 ext 5933 FAX 513-871-7998, e-mail toddg@robbinsfloor.com.

#### B. Product:

- 1. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
  - a. Connor Sports Flooring:
    - 1) Northern Hard Maple in random lengths.
  - b. Robbins Sports Surfaces:
    - 1) Northern Hard Maple in random lengths or continuous strip XL.

#### C. Components:

- Vapor Retarder Membrane:
  - a. 6 mil polyethylene.
  - b. PVC tape or adhesive.
- 2. Resilient Pads: 2-1/4 inches wide by 3 inches long by 3/8 inch thick PVC pads with slots or air cells.
- 3. Subfloor Plywood: Four-ply minimum, APA graded and stamped, 15/32 inch CDX plywood.
- 4. Finish Flooring:
  - a. Hardwood: Northern Hard Maple, No. 2 and better grade MFMA trademarked and grade marked. 25/32 inch by 2-1/4 inch minimum, MFMA-RL or MFMA-FJ, with specially milled ends.
  - Fasteners: Power-driven, 2 inch long barbed cleats or coated staples recommended by Flooring Manufacturer.
- 5. Base: 2-1/2 inches by 2-1/2 inches by 1/8 inch aluminum angle in clear anodized finish.
- 6. Threshold Plate: 5 inches wide by 1/4 inch thick aluminum, fluted on top, slightly tapered both edges in finish selected by Architect.
- 7. Finish:
  - a. Sealer: As recommended by Top Coat Manufacturer.
  - b. Top Coats:
    - 1) Description:
      - a) High gloss, high solids, oil-modified urethane or water based finishes.
    - 2) Oil Modified Urethane:
      - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Standard finish:
          - (a) Polyurethane 450 or Polyurethane 500 by Sealed Air Diversey Care, Sturtevant, WI www.diversey.com/woodcare.
          - (b) 450 Gym Finish or Gold Medalist 40 Gym Finish by Hillyard Industries, St. Joseph, MO www.hillyard.com.
        - (2) Oil Modified Low VOC one coat products (for Sustainable Design Requirements and/or low odor) Finish:
          - (a) Polyurethane 275 One Coat Finish by Sealed Air Diversey Care, Sturtevant, WI www.diversey.com/woodcare.
          - (b) 275 Gym Finish by Hillyard Industries, St. Joseph, MO www.hillyard.com.
  - c. Game Lines:
    - 1) Colors:
      - a) Basketball: Black.b) Volleyball: Grey.

## PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Category One VMR Wood Athletic Flooring Installers. See Section 01 6200:
  - 1. Connor Sports Floors:

a. Mountain Heights Hardwood
 b. United Services
 c. Soriano Floors
 (801) 772-0961
 (208) 589-9440
 (208) 602-2582

2. Robbins Sports Flooring

a. Croft-Beck, SLC (801) 973-6969

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Follow Flooring Manufacturer's prescribed inspection procedure for determining acceptability of installation conditions, including environmental conditions in building during and after installation, moisture content of slab, flatness and levelness of slab, etc.
  - Verify concrete surfaces are sufficiently cured and moisture content is within acceptable levels before beginning installation.
  - 3. Verify ventilation requirements as specified in Field Conditions in Part 1 of this specification have been maintained before proceeding with applying wood floor finish.

#### B. Evaluation And Assessment:

- Wood Athletic Flooring:
  - a. Verify before installing aluminum angle base, location of framing member base plate or vertical framing member if attachment to framing member base plate is not feasible.

#### 3.3 PREPARATION

- A. Surface Preparation:
  - Correct deficiencies identified during Pre-Installation Conference and confirm acceptance and approval of substrate with Architect before beginning installation of flooring system.
  - 2. Concrete floor slab patching:
    - a. Cracks, chips and joints must be properly patched or repaired.
  - 3. Concrete surface cured, clean, dry, and free of foreign substances that will compromise flooring installation.
    - a. Removal of curing compounds.
    - b. Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
    - c. Removal of overspray from painted walls (essential so glue will stick).
  - 4. Moisture vapor emission tests and alkalinity test of concrete slab has been performed.
  - 5. Vacuum and damp mop floor areas to receive flooring before flooring installation.

#### 3.4 INSTALLATION

- A. Do not install wood flooring until interior 'wet type' systems are dried out and overhead trades have completed work in wood floor areas.
- B. Vapor Retarder Membrane:
  - 1. Lap joints 6 inches and completely seal.
  - 2. Extend and terminate membrane at walls.
- C. Cushioned Panels:
  - 1. Place 32 resilient pads on under-side of first layer of plywood 6 inches in from edges of plywood and 12 inches on center each way.
  - 2. Lay plywood parallel to short dimension of room with 1/4 inch spacing at joints.
  - 3. Place second layer of plywood on diagonal with first layer, with 1/4 inch joints, and secure by screwing, nailing, or stapling, as acceptable to Flooring Manufacturer, at 12 inches on center.
  - 4. Expansion Provisions:
    - a. Leave 1-1/2 inches gap between flooring and walls for expansion at perimeters.
- D. Volleyball Floor Plates:
  - 1. Install in accordance with Plate Manufacturer's instructions and as detailed.
- E. Laying And Power Nailing of Finish Flooring:
  - 1. Lay flooring parallel to long dimension of room.
  - 2. Tightly drive end joints and properly fit side joints to meet requirements of Manufacturer to meet humidity requirements.
  - 3. Machine nail.

# F. Aluminum Angle Base:

- 1. Wood-Framed Walls:
  - a. Firmly attach only to wall with panhead, cadmium plated, wood screws.
  - b. Length of screws shall be sufficient to embed in substrate 1-1/2 inches minimum.
  - c. Attachment to wall:
    - 1) Framing member base plate attachment:
      - a) Locate screws 3 inches maximum from edge and 24 inches maximum on center spacing between screws into framing member base plate.
    - 2) Vertical Framing member attachment:
      - a) Match vertical framing member.

# 2. Placing screws:

- a. Place screws approximately one inch down from top of base.
  - If screw attachment will miss framing member base plate, locate attachment into vertical framing member.

#### 3. Spacer:

- a. Attach one 3/16 inch by 1/2 inch by one-inch masonite spacer to metal angle base immediately above each screw hole with contact cement.
- 4. Tighten screws to bring base into gentle contact with floor.
  - a. Do not interfere with free movement of floor.
- 5. Miter corner joints and grind toe of base on outside corners to 1/2 inch radius. Grind or file down burrs and rough or sharp edges at joints.
- 6. Leave in true alignment with 3/16 inch space between wall and base.

#### G. Aluminum Threshold:

- Neatly and substantially anchor aluminum threshold plates located across expansion gaps at door and other floor surface openings with permanent type rust proof anchors. Do not fasten to wood floor.
- 2. Do not lag fixtures, equipment, plates, outlet boxes, or other items through subfloor to floor unless adequate provision is made for expansion.

#### H. Sanding Sequence:

- Make sure floor is free of moisture.
- 2. Sweep floors clean.
- 3. Sand with heavy, power driven type sander. Use dust accumulator on machine.
- 4. Begin sanding with No. 36 or No. 40 grit sandpaper. Sand on diagonal if required to level boards.
- 5. Proceed with medium grit, 50 or 60 grit sandpaper. Perform this sanding and subsequent sanding passes in direction of grain of floor.
- 6. Sand edges with No. 60 or 80 grit spinner paper.
- 7. Sand entire floor with No.80 or 100 grit sandpaper.
- 8. Disk and entire floor with No. 100 disk paper. Finish with 120 screens.
- 9. Scrape and hand-sand corners and other areas not reached by machine.

#### I. Finishing:

- 1. Allow for adequate ventilation to insure proper curing.
- 2. Apply two (2) coats of sealer at rate and instructions recommended by Finish Manufacturer. Vacuum, screen and tack between coats as recommended by Finish Manufacturer. (Note: solvent based sealer is preferred were feasible)
- 3. Proper screening, vacuuming and tacking procedures should be followed at each stage of finishing process.
- 4. Apply game lines.
- 5. Apply top coats with ample time between coats for material to properly dry before applying additional coats:
  - a. Coverage per gallon (liter) shall be at rate and number of coats recommended by Finish Manufacture (Typically two (2) coats unless using high solids high performance products).
  - b. Top coats can consist of additional sealer or lower solids product followed with final high solids or high performance top coat.

# 3.5 FIELD QUALITY CONTROL

# A. Field Tests:

 See Section 09 0503 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.

# 3.6 CLEANING

- A. Waste Management:
  - 1. Installer's Responsibility:
    - a. All work areas are to be kept clean, clear and free of debris at all times.
    - b. Disposal of rubbish in provided dumpster(s).
  - 2. Contractor's Responsibility:
    - a. Provide adequate waste receptacles (dumpsters) and dispose of Owner Furnished materials from building and property as specified in Section 01 7400.

# 3.7 PROTECTION

- A. Contractor's Responsibility:
  - 1. Protect flooring from abuse, vandalism, contaminants, or damage occurring after installation is complete.
  - 2. Protect floor finish until Substantial Completion.
  - 3. Keep floor free of traffic for seventy-two (72) hours minimum after application of final coat.

END OF SECTION

# SECTION 09 6513 RESILIENT BASE AND ACCESSORIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes But Not Limited To:
  - 1. Resilient Base as described in Contract Documents.
  - Stairs:
    - a. Stair skirts as described in Contract Documents.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Flame Spread: Propagation of flame over a surface.
  - 2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
  - 3. Resilient Wall Base Classification:
    - a. Type:
      - 1) TS: Rubber, vulcanized thermoset.
      - 2) TP: Rubber, thermoplastic.
      - 3) TV: Vinyl, thermoplastic.
    - b. Group:
      - 1) Group 1: Solid (homogeneous).
      - 2) Group 2: Layered (multiple layers).
    - c. Styles:
      - 1) Style A: Straight.
      - 2) Style B: Cove.
      - 3) Style C: Butt-to.
  - 4. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723
- B. Reference Standards:
  - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - b. ASTM F1861-16, 'Standard Specification for Resilient Wall Base'.
  - Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 Tenth Edition).

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate completion of resilient base and accessories installation with other trades.
- B. Pre-Installation Conference:
  - Participate in pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6813 and Section 09 6816 pre-installation conference.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
    - a. Review if stairs are included for Project.
    - b. Review if stair skirts are included for Project.

# 1.4 SUBMITTALS

A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's literature or cut sheet on base and adhesive.
  - b. Color selection.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics:
    - a. Surface-Burning Characteristics:
      - 1) Base shall have Class B flame spread rating in accordance with ASTM E84 or UL 723.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - Store materials in dry space protected from weather at not less than 55 deg F or more than 85 deg F (29.4 deg C) or as per Manufacturer's recommendation.
  - 2. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Store materials at not less than 70 deg F for at least twenty four (24) hours before installation.
  - 2. Do not apply in temperatures below 70 deg F.

#### PART 2 - PRODUCTS

# 2.1 SYSTEMS

- A. Manufacturers:
  - Manufacturers Contact List:
    - a. Burke Flooring, San Jose, CA www.burkemercer.com.
    - b. Flexco Corporation, Tuscumbia, AL www.marleyflexco.com.
    - c. Johnsonite, Chagrin Falls, OH or Johnsonite (Canada), Waterloo, ON www.johnsonite.com.
    - d. Roppe Corporation, Fostoria, OH www.roppe.com.
    - e. VPI, Corporation, Sheboygan, WI www.vpicorp.com.

#### B. Materials:

- 1. Wall Base:
  - a. General:
    - 1) Size:
      - a) Minimum body thickness: 1/8 inch by 4 inch
      - b) Length: not less than normal.
    - 2) Corners:
      - a) Use preformed, molded external corners for both inside and outside corners.
      - b) Butt joint interior corners.
      - c) Corners must meet same height and thickness requirements as wall base.
  - b. Design Criteria:
    - 1) Meet requirements of ASTM F1861, Type TP or TS, Group 1 (solid), Style B (cove).
    - 2) Free from objectionable odors, blisters, cracks, and other defects affecting appearance or serviceability of rubber, and not containing fabric.
    - 3) Style: Coved.
  - c. Colors:
    - Color pigments used shall be highly fade-resistant, insoluble in water, and resistant to light, alkali, and cleaning agents.

- 2) Colors as selected by Architect from Manufacturer's standard colors.
- d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) RubberMyte Wall Base by Burke.
  - 2) Base 2000 Wall Base by Flexco.
  - 3) Rubber Wall Base by Johnsonite.
  - 4) Rubber Wall Base by Roppe.
  - 5) Rubber Wall Base by VPI.

#### Stair Skirts:

- a. General:
  - 1) Cut from stock 1/8 inch (to contour and profile of stairs.
- b. Design Criteria:
  - 1) Meet requirements of ASTM F2169, Type TP or TS, Class 2.
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
- Adhesive:
  - a. Use products recommended by Manufacturer for conditions of use.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Inspect surfaces for conditions not suitable for installation. Surface to receive specified items shall be sound, clean, free from foreign matter, tightly nailed, and dry.
  - 2. Notify Architect of unsuitable conditions in writing:
    - a. Do not start work until defects are corrected.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

# 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Remedy cracks and minor irregularities in substrate in accordance with Manufacturer's recommendations.

# 3.3 INSTALLATION

- A. Base:
  - 1. Install in manner to produce smooth, even finished surfaces tightly jointed and accurately aligned.
  - 2. Fit specified items tightly. Use fillers where necessary. Fit neatly against projections, piping, electrical service outlets, etc.
  - 3. Secure specified items with specified adhesive. Cement substantially to vertical surfaces including rubber base to cabinet work base.
  - 4. Line up top and bottom lines of base throughout.
  - 5. Do not stretch base during installation.
  - 6. Roll until firm bond has been established. Leave level, free from buckles, cracks, and projecting edges.
  - 7. In wall runs longer than 12 inches, install no lengths of base shorter than 12 inches long.

# 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Replace damaged materials at no additional cost to Owner.
  - 2. Damaged materials are defined as having cuts, gouges, scrapes or tears, and not fully adhered.

## 3.5 CLEANING

- A. General:
  - 1. Base:

- Clean all exposed surfaces of base of adhesive spatter before it sets in accordance with Manufacturer's cleaning instructions.
- b. Damp-mop surfaces to remove marks and soil.
- 2. Adjacent Work:
  - a. Clean all exposed surfaces of adjoining areas of adhesive spatter before it sets.

# 3.6 PROTECTION

- A. Base:
  - 1. Cover material until Substantial Completion.
  - 2. Keep traffic away until adhesive has set.

END OF SECTION

# SECTION 09 6813 TILE CARPETING

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes But Is Not Limited To:
  - 1. Coordination, sequencing, and scheduling for installation of Owner-Furnished carpet tiles and carpet base used in entry vestibules using walk-off carpet tile as described in contract documents and including following:
    - a. Schedule Testing Agency testing of Alkalinity and Concrete Moisture of concrete slab before Pre-Installation Conference as specified in Section 09 0503 'Floor Substrate Preparation'.
    - b. Schedule Pre-Installation Conference held in conjunction with Section 09 6816.
    - c. Maintain Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
    - d. Protection of carpet after installation of carpeting as required.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Carpet Tiles.
- C. Related Requirements:
  - Section 01 1200: 'Multiple Contract Summary'. Owner will furnish and install carpet tiles and carpet base. This
    Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's
    Representatives.
  - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
  - 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for provision of acceptable concrete substrate.
  - 4. Section 09 0503: 'Flooring Substrate Preparation' for:
    - a. Floor substrate preparation.
    - b. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
    - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring.
  - 5. Section 09 6816: 'Sheet Carpeting' for:
    - a. Installation of Carpet Tile and Carpet Base:
    - b. Cleaning and Disposal requirements.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. The Carpet and Rug Institute Inc. (CRI), Dalton, GA www.carpet-rug.org:
    - a. CRI Indoor Air Quality (IAQ):
      - 1) CRI Green Label Plus Certification.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate completion of flooring installation with other trades.
- B. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6816 pre-installation conference.
  - 2. Schedule pre-installation conference after Concrete Moisture testing and before installation of flooring system.
  - 3. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
  - 4. Schedule conference after substrate preparation and ONE (1) week before installation of flooring system.
  - 5. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
    - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab:

- 1) Follow Testing Agency report regarding Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
- b. Review Owner's Representative schedule for furnishing and installation carpet.
- c. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
- d. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
- e. Review cleaning and disposal requirements.
- f. Review protection requirements of carpet after installation of carpeting.

# C. Scheduling:

- Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09
  0503 'Floor Substrate Preparation'.
- Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.
- 3. Notify Owner's Representative to coordinate installation of carpet.

#### 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Copy of Warranty.
    - b. Record Documentation:
      - 1) Owner will provide Project Carpet Request Documentation forms in both hard copy and digital format:
        - a) Carpet Request Information Sheet.
        - b) Carpet Vendor Quotation.
        - c) Carpet Pre-installation Meeting Agenda.
        - d) Carpet Installation Notice to Proceed or Cancel.
        - e) Carpet Inspection and Completion.
        - f) Carpet Overage Report and Completion.
        - g) Carpet Quotation Change Request.
      - Owner to provide Testing Agency Testing Report of Alkalinity and Concrete Moisture testing for project.
- B. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Leave carpet tiles equivalent to 15 percent of number installed as attic stock.
    - b. Tie securely and wrap in protective cover.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver materials and accessories necessary for completion of carpet installation to site before beginning installation of carpet.
  - 2. Do not deliver materials before date scheduled for installation.
- B. Storage And Handling Requirements:
  - 1. Store carpet and related materials in a climate-controlled, dry space.
  - 2. Protect carpet from soil, dust, moisture and other contaminants.

# 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Building Conditions:
    - Conditions inside building shall be brought to levels to be normal at occupancy of building. Conditions
      include normal levels of humidity, lighting, heating, and air conditioning.
      - Carpet installation is not to begin until HVAC system is operational and following conditions are maintained for at least forty-eight (48) hours before, during and seventy-two (72) hours after completion:

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- Carpet is to be installed when indoor temperature is between 65° 95° F with maximum relative humidity of 65%.
- b) Substrate surface temperature should not be less than 65° F at time of installation.
- Do not allow temperature of indoor carpeted areas to fall below 50° F, regardless of age of installation.
- 2) Maintain fresh air ventilation after installation for seventy-two (72) hours minimum or until lingering odors are gone.

#### 2. Concrete Slab:

- a. General:
  - 1) Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have Alkalinity range and Concrete Moisture Vapor Emission Rate (MVER) as specified in Section 09 0503 'Floor Substrate Preparation'.
  - 2) Final determination as to whether or not concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing as specified in Section 09 0503 'Floor Substrate Preparation'.
- b. Alkalinity:
  - Do not install sheet carpeting if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
- c. Concrete Moisture Vapor Emission Rate (MVER):
  - Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
  - 2) Follow requirements specified in Section 09 0503 'Floor Substrate Preparation' before installation of carpet.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide Carpet Manufacturer's standard Warranty which includes following:
    - a. Warranty shall cover defects in installation, workmanship, and installation materials.
    - b. Warranty includes specific workmanship warranties for delamination, edge raveling, fuzzing, pilling, and other textural changes which can be controlled through proper manufacturing (no fraying, zippering, delamination, edge raveling, fuzzing, pilling in carpet is acceptable for any reason).
    - c. Warranty terms will include inspection of defective area within fifteen (15) days of receipt of written notice from Owner and completion of corrective work within forty-five (45) days, unless other arrangements are made in writing with Owner on case-by-case basis.
    - d. If carpet defect or installation defect continues to appear after two (2) separate notices for correction from Owner, replace carpet where defects have occurred.
    - e. If Carpet Manufacturer follows installation requirements of Section 09 0503 'Floor Substrate Preparation' Carpet Manufacture accepts liability of carpet installation for said given time as outlined in Special Warranty regardless of any climate or condition changes affecting RH levels of floor substrate.
  - 2. Special Warranty:
    - a. Modular Carpeting:
      - 1) General:
        - a) Appearance Retention to be provided with Special Warranty requirements if not already included in Standard Warranty.
      - 2) Meetinghouse, Mission Office, S&I Module, and O&M / R&I:
        - a) Owner Carpet Program Product: Provide fifteen (15) year minimum or Carpet Manufacturer's better Warranty on carpet system.

# PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category One VMR Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. Tandus Centiva, Dalton, GA www.tandus-centiva.com.
    - a. Contact Information: Tracy Riddle cell (801) 580-5147 fax (866) 861-7522 Tracy.Riddle@Tarkett.com.

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#### B. Materials:

- 1. Carpet Tiles (walk-off) Vestibules only:
  - a. Carpet OPTION C (based on moisture testing specified in Section 09 0503):
    - Carpet Tiles are not approved. Use following carpeting specified in Section 09 6816, 'Sheet Carpeting'.
    - Category Four Approved Manufacturer and Color / Patterns. See Section 01 6200 for definitions of Categories:
      - a) Abrasive Action II by Tandus Centiva:
      - b) Color: Winter Gray 19103.
- 2. Carpet Base (entry vestibules using walk-off carpet tile):
  - a. 4-1/2 inch wide base without cushion backing. Top edge of base serged with 1-1/4 inch polyester binding fabric. Roll edges of binding fabric under and sew along top edge of carpet cove base.
  - b. Carpet OPTION C (based on moisture testing specified in Section 09 0503):
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories
      - a) Abrasive Action II by Tandus Centiva:
        - (1) Color: Winter Gray 19103.

#### PART 3 - EXECUTION

# 3.1 APPROVED INSTALLER

A. Same Installer of Section 09 6816: 'Sheet Carpeting' shall install Section 09 6813: 'Tile Carpeting'.

# 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify concrete moisture content is within acceptable levels before beginning installation.
- B. Evaluation And Assessment:
  - 1. Concrete Slab:
    - a. Variation In Grade: Plus or minus 1/8 inch in any 10 foot of floor slab and distance between high point and low point of slab of 1/2 inch.
    - b. Testing Procedure: Place ends of straightedge on 3/8 inch high shims. Floor is satisfactory if 1/4 inch diameter steel rod rolled under straightedge will not touch anywhere along 10 foot length and 1/2 inch diameter steel rod will not fit under straightedge anywhere along 10 foot length.
    - c. Notify Facilities Manager in writing if floor surface is not acceptable to install carpet. Do not lay carpet over unsuitable surface. Commencing installation constitutes acceptance of floor and approval of existing conditions.

#### 3.3 PREPARATION

- A. Flooring Preparation:
  - 1. Prepare floor substrate in accordance with Carpet And Rug Institute (CRI) best practices to receive carpet installation and to provide installation that meets Carpet Manufacturer's warranty requirements:
    - a. Concrete floor slab patching:
      - 1) Cracks, chips and joints must be properly patched or repaired.
    - b. Concrete surface cured, clean, dry, and free of foreign substances that will compromise carpet and/or other flooring installations.
      - 1) Removal of curing compounds.
      - Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
      - 3) Removal of overspray from painted walls (essential so glue will stick).
  - 2. Moisture vapor emission tests and alkalinity test of concrete slab has been preformed.
  - 3. Vacuum and damp mop floor areas to receive flooring before flooring installation.
- B. Carpet Accessories:
  - 1. Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

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#### 3.4 INSTALLATION

#### A. Carpet:

- General:
  - Install carpet and carpet base in accordance with CRI Carpet Installation Standard and manufacturer's written instructions supplied with product.
  - b. Install carpet under edge of metal thresholds where possible. Use specified carpet accessories at exposed edges.

#### B. Carpet Base:

- 1. Precut base so seams occur only at inside corners.
- Scribe base to floor.
- 3. Spread adhesive over back side of base up to bottom of serging on edge or apply three 3/16 inch minimum diameter beads of adhesive placed one inch apart on back of base with top bead placed 2 inch down from serged edge of base and spread adhesive over back surface of base up to bottom edge of serging.
  - a. Bird's mouth finish should only be required when door frame is flush with wall.
  - b. If bird's mouth is required, terminate at door frames or vertical trim with 45 degree angle, bird mouth cut so serged edge turns down to contact frame or trim.
- 4. Do not allow adhesive beyond edge of base. Remove excess adhesive.
- 5. Do not use staples, nails, screws or other mechanical fasteners.
- 6. Set carpet base on brick walls at height either above or below horizontal mortar joint line.

# 3.5 FIELD QUALITY CONTROL

#### A. Field Tests:

1. See Section 09 0503.02-FM 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.

#### B. Field Inspections:

- 1. Unacceptable carpet after installation shall include but not be limited to:
  - a. Delaminating carpet from backings.
  - b. Fiber loss less than specified.
  - c. Edge raveling.
  - d. Fuzzing of carpet fibers.
  - e. Pilling of carpet fibers.
  - f. Appearance retention less than control samples attached to Agreement.
  - g. Dye bleeding.
  - h. Zippering fibers in carpet.
  - i. Color streaking.
  - j. Irregular tufts of fiber.
- 2. Unacceptable workmanship shall include but not be limited to:
  - a. Improper floor preparation before installation.
  - b. Failure of adhesive to completely adhere carpet to floor resulting in bubbles, ridges, or ripples where carpet has separated from floor.
  - c. Failure to properly install carpet next to walls and door frames to eliminate gaps or puckering of carpet.
  - d. Use of unspecified carpet.
  - e. Carpet base ends not finished to terminate at door frames or vertical trim shall have 45 degree angle 'birdsmouth' finish.
  - f. Adhesive exposed on carpet, on carpet base, beyond edges of carpet base, and on other surfaces of building.
  - g. Carpet base that is not scribed to fit against floor with no gaps.
  - h. Carpet base attached by means other than acceptable carpet base adhesive.

## C. Non-Conforming Work:

- 1. Basis of Acceptable Carpeting: Source Quality Control Testing:
  - a. Carpet products not meeting Design Criteria and Source Quality Control Testing of this specification will be considered unacceptable carpeting.
- 2. Unacceptable Carpeting:
  - a. Unacceptable carpeting will be rejected and shall be repaired or replaced at no additional cost to Owner. Owner's Representative will determine reasonable location of acceptable transition points for removal of unacceptable carpet.

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#### 3.6 CLEANING

#### A. General:

- 1. Carpet Installer's Responsibility:
  - a. Clean all exposed surfaces of adjoining areas of adhesive spatter before it sets.
  - b. Carpeting:
    - 1) Remove any soiling and/or staining from carpet.
    - 2) Remove excessive adhesive with manufacturer recommended adhesive removers.

#### B. Damage to building:

- Carpeting:
  - a. Carpet Installer's Responsibility:
    - 1) Clean and repair of all damaged surfaces to their original condition from carpet installation.

# C. Waste Management:

- 1. Carpet Installer's Responsibility:
  - a. All work areas are to be kept clean, clear and free of debris at all times.
  - b. Provide adequate waste receptacles and dispose of materials including all rubbish, wrapping paper, scraps, and trimmings from building and property in approved manner as specified in Section 01 7400 unless prearrangements have been made with Owner and estimated costs are included on estimate and Purchase Order (PO).

#### 3.7 PROTECTION

- A. Protection of Carpeting:
  - 1. Owner Representative's Responsibility:
    - a. No traffic of any kind on newly installed carpet for minimum of twenty-four (24) hours after installation is completed.
    - b. No wheeled traffic of any kind placement of furniture or equipment on carpet for minimum of forty-eight (48) hours after completion of carpet installation.
    - c. Protect carpet from abuse, vandalism, or damage occurring after installation is complete.
    - d. Protect carpet adequately from soil, dust, moisture and other contaminants after carpet installation.

END OF SECTION

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# SECTION 09 6816 SHEET CARPETING: Back Cushion, Direct Glue

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section Includes But Is Not Limited To:
  - 1. Coordination, sequencing, and scheduling installation of Owner-Furnished carpet, carpet base, carpet accessories, leveling compounds as described in Contract Documents and including following:
    - a. Testing of Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
    - b. Pre-Installation Conference held in conjunction with Section 09 6813.
    - c. Maintain Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
    - d. Protection of carpet after installation of carpeting as required.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Carpet Tile.
- C. Related Requirements:
  - Section 01 1200: 'Multiple Contract Summary' for carpet and carpet base excluded from Contract and furnished and installed by Owner. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for provision of acceptable concrete substrate.
  - 3. Section 09 0503: 'Flooring Substrate Preparation' for:
    - a. Floor substrate preparation.
    - b. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
    - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring.
  - 4. Section 09 6513: 'Resilient Base And Accessories' for resilient base.
  - 5. Section 09 6813: 'Tile Carpeting' for:
    - a. Tile carpeting and carpet base used in entry vestibules using walk-off carpet tile.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. The Carpet and Rug Institute (CRI), Dalton, GA www.carpet-rug.org. Standard for Installation Specification of Commercial Carpet:
    - a. CRI Indoor Air Quality (IAQ):
      - 1) CRI Green Label Plus Certification.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate completion of carpet installation with other trades.
- B. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6813 pre-installation conference.
  - 2. Schedule pre-installation conference before installation of flooring system.
  - 3. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
  - 4. Schedule conference after substrate preparation and ONE (1) week before installation of flooring system.
  - 5. In addition to agenda items specified Section 01 3100 and Section 09 0503, review following:
    - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab.

- 1) Follow Testing Agency report regarding Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
- b. Review Owner's Representative schedule for furnishing and installation carpet.
- c. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
- d. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
- e. Review cleaning and disposal requirements.
- f. Review protection requirements of carpet after installation of carpeting.

# C. Scheduling:

- Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09
  0503 'Floor Substrate Preparation'.
- 2. Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.
- 3. Notify Owner's Representative to coordinate installation of carpet.

#### 1.4 SUBMITTALS

#### A. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Copy of Warranty.
  - b. Record Documentation:
    - 1) Owner will provide Project Carpet Request Documentation forms in both hard copy and digital format:
      - a) Carpet Request Information Sheet.
      - b) Carpet Vendor Quotation.
      - c) Carpet Preinstallation Meeting Agenda.
      - d) Carpet Installation Notice to Proceed or Cancel.
      - e) Carpet Inspection and Completion.
      - f) Carpet Overage Report and Completion.
      - g) Carpet Quotation Change Request.
    - Owner to provide Testing Agency Testing Report of Alkalinity and Concrete Moisture testing for project.

#### B. Maintenance Material Submittals:

- 1. Extra Stock Materials:
  - a. Leave excess pieces of carpet, 6 feet square or larger and 25 lineal feet minimum of carpet cove base.
  - b. Roll up and tie securely.

# 1.5 DELIVERY, STORAGE, AND HANDLING

#### A. General:

 Comply with instructions and recommendations of Manufacturer for special delivery, storage, and handling requirements.

# B. Delivery And Acceptance Requirements:

- 1. Deliver materials and accessories necessary for completion of carpet installation to site before beginning installation of carpet.
- 2. Do not deliver materials before date scheduled for installation.
- 3. Transport carpet in manner that prevents damage and distortion. Bending or folding individual carpet rolls or cuts from rolls is not recommended. When bending or folding is unavoidable for delivery purposes, carpet is required to be unrolled and allowed to lie flat immediately upon arrival at installation site.

# C. Storage And Handling Requirements:

- 1. Store carpet and related materials in a climate-controlled, dry space.
- 2. Protect carpet from soil, dust, moisture and other contaminants and store on a flat surface.
- 3. Stacking heavy objects on top of carpet rolls or stacking more than three rolls is prohibited.

#### 1.6 FIELD CONDITIONS

#### A. Ambient Conditions:

- 1. Building Conditions:
  - a. Conditions inside building shall be brought to levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning. (HVAC must be in operation thru out carpet installation):
    - Carpet installation is not to begin until HVAC system is operational and following conditions are maintained for at least forty-eight (48) hours before, during and seventy-two (72) hours after completion:
      - a) Carpet is to be installed when indoor temperature is between 65° 95° F with maximum relative humidity of 65%.
      - b) Substrate surface temperature should not be less than 65° F at time of installation.
      - Do not allow temperature of indoor carpeted areas to fall below 50° F, regardless of age of installation.
    - 2) Maintain fresh air ventilation after installation for seventy-two (72) hours minimum or until lingering odors are gone.

#### 2. Concrete Slab:

- a. General:
  - Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have Alkalinity range and Concrete Moisture Vapor Emission Rate (MVER) as specified in Section 09 0503 'Floor Substrate Preparation'.
  - 2) Final determination as to whether or not concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing as specified in Section 09 0503 'Floor Substrate Preparation'.
- b. Alkalinity:
  - Do not install sheet carpeting if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
- c. Concrete Moisture Vapor Emission Rate (MVER):
  - Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
  - Follow requirements specified in Section 09 0503 'Floor Substrate Preparation' before installation of carpet.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide Carpet Manufacturer's standard Warranty which includes following:
    - a. Warranty shall cover defects in installation, workmanship, and installation materials.
    - b. Warranty includes specific workmanship warranties for delamination, edge raveling, fuzzing, pilling, and other textural changes which can be controlled through proper manufacturing (no fraying, zippering, delamination, edge raveling, fuzzing, pilling in carpet is acceptable for any reason).
    - c. Warranty terms will include inspection of defective area within fifteen (15) days of receipt of written notice from Owner and completion of corrective work within forty-five (45) days, unless other arrangements are made in writing with Owner on case-by-case basis.
    - d. Carpet defect or installation defect:
      - Carpet Manufacturer may use any reasonable means to cure first three (3) breaches of warranty affecting an area of carpeting bounded by natural breaks such as doorways, stairs, rostrum and platform ('affected carpet area'). Such cure must preserve as uniform a blended appearance, acceptable to Carpet Manufacturer and Owner, as exists throughout Installation Site at time of breach.
      - If carpet defect or installation defect continues to appear after three (3) separate notices for correction from Owner, replace carpet where defects have occurred.
    - e. If Carpet Manufacturer follows installation requirements of Section 09 0503 'Floor Substrate Preparation' Carpet Manufacture accepts liability of carpet installation for said given time as outlined in Special Warranty regardless of any climate or condition changes affecting RH levels of floor substrate.
  - 2. Special Warranty:
    - a. Sheet Carpeting:
      - 1) General:
        - Appearance Retention to be provided with Special Warranty requirements if not already included in Standard Warranty.

- 2) Meetinghouse, Mission Office, and O&M / R&I:
  - Owner Carpet Program Product: Provide twenty (20) year minimum or Carpet Manufacturer's better Warranty on carpet system.

# PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category One VMR Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. Materials supplied for carpet installation shall be complete package from specified Carpet Manufacturer:
    - a. Tandus Centiva: Dalton, GA www.tandus-centiva.com.
      - Contact Information: Tracy Riddle cell (801) 580-5147 fax (866) 861-7522 Tracy.Riddle@Tarkett.com.

#### B. Materials:

- 1. Carpet:
  - a. Carpet OPTION C (based on moisture testing specified in Section 09 0503):
    - Category Four Approved Manufacturer and Color / Patterns. See Section 01 6200 for definitions of Categories:
      - a) Emerald '1':
        - (1) Tandus Centiva: Style 04425 Ensign, color Emerald 86074.
- 2. Carpet Base:
  - a. 4-1/2 inch wide base made of same carpet from Manufacturer as used in each room, but without cushion backing. Top edge of base serged with 1-1/4 inch polyester binding fabric to coordinate with Owner's color scheme. Roll edges of binding fabric under and sew along top edge of carpet cove base.

# 2.2 ACCESSORIES

- A. Carpet Accessories: Snap-in vinyl reducer strips and vinyl track.
- B. Floor Leveling Compound, Floor Patching Compound, And Latex Underlayment: As recommended and approved by Carpet Manufacturer.
- C. Floor Stoning:
  - 1. Provide at bottom of Rostrum Ramp.
  - 2. Provide at base plate for Rostrum Riser when located at Rostrum platform framing.

#### PART 3 - EXECUTION

# 3.1 APPROVED INSTALLER

A. Same installer of Section 09 6816: 'Sheet Carpeting' shall install Section 09 6813: 'Tile Carpeting'.

#### 3.2 EXAMINATION

- A. Verification of Conditions:
  - 1. Carpet Areas:
    - a. Verify concrete surfaces are sufficiently cured and moisture content is within acceptable levels before beginning installation as specified in Section 09 0503, 'Floor Substrate Preparation'. If test results exceed limitations, do not proceed with installation, until problem has been corrected:
      - Notify Owner's Representative in writing if floor surface is not acceptable to install carpet:
        - Do not lay carpeting over unsuitable surface. Commencing installation constitutes acceptance
          of floor and approval of existing conditions.

#### B. Evaluation And Assessment:

- Carpet Areas:
  - a. Variation In Grade:
    - Plus or minus 1/8 inch in any 10 foot of floor slab and distance between high point and low point of slab of 1/2 inch.
  - b. Testing Procedure:
    - 1) Place ends of straightedge on 3/8 inch high shims.
    - 2) Floor is satisfactory if 1/4 inch diameter steel rod rolled under straightedge will not touch anywhere along 10 foot length and 1/2 inch diameter steel rod will not fit under straightedge anywhere along 10 foot length.
  - c. Notify Owner's Representative in writing if floor surface is not acceptable to install carpet:
    - Do not lay carpet over unsuitable surface. Commencing installation constitutes acceptance of floor and approval of existing conditions.

#### 3.3 PREPARATION

#### A. Carpet Areas:

- 1. Flooring Preparation:
  - a. Owner-Furnished Product Supplier's Responsibility:
    - Prepare floor substrate in accordance with 'CRI Carpet Installation Standard' best practices to receive carpet installation and to provide installation that meets warranty requirements.
    - 2) Verify concrete surface cured, clean, dry, and free of foreign substances that will compromise carpet and/or installation.
  - b. Concrete floor slab patching:
    - 1) Cracks, chips and joints must be properly patched or repaired.
  - Concrete surface cured, clean, dry, and free of foreign substances that will compromise carpet and/or other flooring installations:
    - 1) Removal of curing compounds.
    - 2) Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
    - 3) Removal of overspray from painted walls (essential so glue will stick).
  - d. Moisture vapor emission tests and alkalinity test of concrete slab has been preformed.
  - e. Vacuum and damp mop floor areas to receive flooring before flooring installation.
- 2. Relaxing / Conditioning Carpet:
  - a. Highly recommended that carpet be unrolled and allowed to relax in installation area for time period that conforms to requirements of manufacturer of product being installed:
  - b. Protect carpet adequately from soil, dust, moisture and other contaminants.
  - c. Sundry items, such as adhesives, should also be conditioned.
- 3. Carpet Accessories:
  - a. Owner-Furnished Product's Responsibility:
    - 1) Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

#### 3.4 INSTALLATION

# A. Carpet:

- 1. General
  - a. Install carpet and carpet base in accordance with 'CRI Carpet Installation Standard' and Manufacturer's written instructions supplied with product.
  - b. Adhesion of carpet cushion (or secondary backing) to floor substrate and adhesion of carpet primary and secondary backings shall be continuous on floor surface so there are no bubble, ridges, or any separation of carpet from backings or backing from floor substrate caused by failure of carpet, backings or cushion, and adhesives as a system.
  - c. Install carpet under edge of metal thresholds where possible. Use specified carpet accessories at exposed edges.
  - d. Generally, install carpet on Rostrum first, Chapel second, and then remainder of building.
- 2. Seaming Requirements:
  - a. Seal seams in accordance with Carpet Manufacturer's instructions and according to CRI Carpet Installation Standard (2009) as applicable. Seam carpet base only at inside corners.
  - b. No seam separation in carpet and no more observable seams from any standing position than that which is unavoidable using best seaming materials and practices available at time of installation.
  - c. Lay rooms parallel to respective Corridors. Seam to permit best use of available carpet.

- d. Quarter turning allowed only at cross-Corridors longer than 24 feet.
- e. Use single or double seams at doorways (single seams preferred). Run nap of pieced carpet in same direction.
- f. Lay carpet lengthwise in Chapel.
- g. Lay carpet lengthwise on Rostrum, parallel to Rostrum seating.
- h. Lay carpet in Foyer parallel to Chapel.
- i. Carpet over Stairs must be laid in Manufactured roll sequence to coordinate with surrounding carpet on floors. Double fill and end seams should be avoided whenever possible.

# B. Carpet Base:

- 1. Precut base so seams occur only at inside corners.
- 2. Scribe base to floor.
- 3. Spread adhesive over back side of base up to bottom of serging on edge or apply three 3/16 inch minimum diameter beads of adhesive placed one inch apart on back of base with top bead placed 2 inch down from serged edge of base and spread adhesive over back surface of base up to bottom edge of serging.
  - a. Bird's mouth finish should only be required when door frame is flush with wall.
  - b. If bird's mouth is required, terminate at door frames or vertical trim with 45 degree angle, bird mouth cut so serged edge turns down to contact frame or trim.
- 4. Do not allow adhesive beyond edge of base. Remove excess adhesive.
- 5. Do not use staples, nails, screws or other mechanical fasteners.

# C. Floor Stoning:

- 1. Rostrum:
  - a. Apply as recommended to bottom of Rostrum Ramp and/or Rostrum Riser base plate if shown on Rostrum platform framing when included on project.

#### 3.5 FIELD QUALITY CONTROL

#### A. Field Tests:

- 1. Carpeting:
  - a. See Section 09 0503 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.

#### B. Field Inspections:

- 1. Carpeting:
  - a. Unacceptable carpet after installation shall include but not be limited to:
    - 1) Delaminating carpet from backings.
    - 2) Fiber loss less than specified.
    - 3) Edge raveling.
    - 4) Fuzzing of carpet fibers.
    - 5) Pilling of carpet fibers.
    - 6) Appearance retention less than control samples attached to Agreement.
    - 7) Dye bleeding.
    - 8) Zippering fibers in carpet.
    - 9) Color streaking.
    - 10) Irregular tufts of fiber.
  - b. Unacceptable workmanship shall include but not be limited to:
    - 1) Improper floor preparation before installation.
    - Failure of adhesive to completely adhere carpet to floor resulting in bubbles, ridges, or ripples where carpet has separated from floor.
    - 3) Seams that do not comply with specified requirements:
      - a) Raveled or untrimmed seams.
      - b) Seams not sealed, level, straight, or even.
      - c) Open seams.
      - d) Seams visibly open when viewed by Project Manager from standing position.
    - Sequence rolls, commercial match issues created by rolls being installed out of sequence will require correction or replacement.
    - Failure to properly install carpet next to walls and door frames to eliminate gaps or puckering of carpet.
    - 6) Use of unspecified carpet.
    - 7) Carpet base ends not finished to terminate at door frames or vertical trim shall have 45 degree angle 'birdsmouth' finish.

- 8) Adhesive exposed on carpet, on carpet base, beyond edges of carpet base, and on other surfaces of building.
- 9) Carpet base that is not scribed to fit against floor with no gaps.
- 10) Carpet base attached by means other than acceptable carpet base adhesive.

# C. Non-Conforming Work:

- Carpeting:
  - a. Basis of Acceptable Carpeting: Source Quality Control Testing:
    - 1) Carpet products not meeting Design Criteria and Source Quality Control Testing of this specification will be considered unacceptable carpeting.
  - b. Unacceptable Carpeting:
    - Unacceptable carpeting will be rejected and shall be repaired or replaced at no additional cost to Owner. Owner's Representative will determine reasonable location of acceptable transition points for removal of unacceptable carpet. Minimum replacement size shall be:
      - a) Between nearest existing seams.
      - b) Between natural transition points or 12 feet of running length.

#### 3.6 CLEANING

- A. General:
  - 1. Carpeting:
    - a. Carpet Installer's Responsibility:
      - 1) Remove any soiling and/or staining from carpet.
      - 2) Remove excessive adhesive with manufacturer recommended adhesive removers.
    - b. Stair Treads:
      - 1) Carpet Installer's Responsibility:
        - Clean all exposed surfaces of stair treads of adhesive spatter before it sets in accordance with Manufacturer's cleaning instructions.

# B. Damage to building:

- 1. Carpeting:
  - a. Carpet Installer's Responsibility:
    - 1) Carpet Installer responsible for cleaning and repair of all damaged surfaces to their original condition from carpet installation.
- C. Waste Management:
  - 1. Contractor's Responsibility:
    - a. Provide adequate waste receptacles (dumpsters) and dispose of Owner Furnished materials from building and property as specified in Section 01 7400.
  - 2. Carpet Installer's Responsibility:
    - a. All work areas are to be kept clean, clear and free of debris at all times.
    - b. Disposal of rubbish, wrapping paper, scraps, and trimmings in provided dumpster(s).

# 3.7 PROTECTION

- A. Protection of Carpeting:
  - 1. Contractor's Responsibility:
    - No traffic of any kind on newly installed carpet for minimum of twenty-four (24) hours after installation is completed.
    - b. No wheeled traffic of any kind placement of furniture or equipment on carpet for minimum of forty-eight (48) hours after completion of carpet installation.
    - c. Protect carpet adequately from soil, dust, moisture and other contaminants after carpet installation.
    - d. Protect carpet from abuse, vandalism, or damage occurring after installation is complete.

# SECTION 09 7216 VINYL-COATED FABRIC WALL COVERINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install wall covering 'Type B' as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for priming of gypsum board surfaces.

#### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Sample:
    - a. Color and pattern selection.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Published installation instructions.
  - 2. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Cleaning and maintenance instructions.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.
        - b) Color and pattern selection.

# 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Meet or exceed Fed Spec CCC-W-408A Type II, Class A. Requirements of this standard restrict approvals to flame spread no higher than 25.
  - 2. Manufacturer shall meet governing codes requiring higher than specified standards.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum one (1) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
    - b. Upon request, submit documentation.

# PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Supplier List:

- a. Guard Performance Wallcovering, distributed by LBI-Boyd Wallcoverings, Glendora, CA.
  - 1) Contact Sandy Bloniarz (606) 376-1454 sandyb@lbiboyd.com.
- b. Koroseal Wallcovering, Fairlawn, OH.
  - 1) Contact Paula Graham (800) 752-9334 or (866) 628-2280 pgraham@koroseal.com.
- c. Versa Wallcovering, Distributed by Tri-Kes Wallcovering Source, Dallas, TX (800) 200-8120 or (972) 484-8120 sales@tri-kes.com.
- d. Len-Tex Wallcoverings, Distributed by MDC Wallcoverings, Elk Grove Village, IL.
  - 1) Contact Peter DeRooy (800) 621-4006 pderooy@mdcwall.com.
- e. US Vinyl Wallcoverings, Distributed by Wall Resources, Salt Lake City, UT (800) 323-8226.
  - 1) Contact Deena Kirk (801) 560-0404 deenakirk@gmail.com.

### B. Description:

- 1. Colors / Patterns:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

SCHEME	GUARD	KOROSEAL	VERSA	LEN-TEX	US VINYL
Emerald '1'	ACT-9733	Legacy CWS 2730 Mythos	JFB009	Alpha 6704	0510-3324

#### C. Materials:

- 1. Wallcovering:
  - a. Supporting Materials: Cotton cloth, Osnaburg, or other suitable materials that will meet above standards.
  - b. Coating Compound: Formulate from Virgin Polymerized or Copolymerized Vinylchloride resin, plasticized with phosphate or phthalate-ester plasticizers exclusively and be integrally pigmented.
  - c. Top Coating: Meet requirements of Table 1 Fed Spec CCC-W-408 clear virgin polymerized vinyl-chloride resin or modified vinyl chloride resin.
    - 1) Use phosphate or phthalate-ester plasticized exclusively.
  - d. Width: 54 inches minimum.
  - e. Minimum Weight: 20 oz per lineal yard for 54 inch width.

### 2.2 ACCESSORIES

- A. Adhesives:
  - 1. Use only fungus resistant adhesives.
  - 2. Type Two Acceptable Products:
    - Roman's Professional Extra Strength by Roman Adhesive Co, Calumet City, IL (800) 488-6117 or (708) 891-0770.
    - b. Equal as recommended by Wall Covering Manufacturer and approved by Architect before use. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 PREPARATION

A. Prime or size surfaces other than gypsum board with material recommended by Wall Covering Manufacturer.

# SECTION 09 7226 SISAL WALL COVERING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnishing and installing wall covering 'Type A' (Sisal) as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 4512: 'Architectural Woodwork Wood Trim' for wood trim for sisal wall covering.
  - 2. Section 09 2900: 'Gypsum Board' for priming of gypsum board.
  - 3. Section 09 8413: 'Fixed Sound-Absorptive Panels'.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
    - a. Flame Spread: The propagation of flame over a surface.
    - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723
    - Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
    - d. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - 2. International Building Code (IBC) (2015 or latest approved edition):
    - a. Chapter 8, 'Interior Finishes':
      - 1) Section 803, 'Wall And Ceiling Finishes':
        - a) 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
        - 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM F84 or UL 723'
  - 3. National Fire Protection Association:
    - a. NFPA 101: 'Life Safety Code' (2015 Edition).
    - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls', (2015 Edition).
  - 4. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 Tenth Edition).

# 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet.
    - b. Maintenance instructions.
    - c. Color and pattern selection.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.

- 2. Qualification Statement:
  - a. Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Cleaning and maintenance instructions.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut sheets.
        - b) Color and pattern selections.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Wall covering shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of wall covering on Project.
    - a. Room Corner Tests:
      - ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
      - 3) IBC 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
      - 4) NFPA 265, 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls'.
      - 5) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.

#### B. Qualifications:

- 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
  - a. Minimum three (3) years experience in wall covering installations.
  - b. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
  - c. Agree to view 'No-Flame Sisal Wall Covering Recommended Installation Procedures' provided by Owner found on internet in AEC Webpage under Training in Menu tab. Contact Architect for access to video. This requirement may be waived by Owner, if Installer has viewed video before or can document at least two (2) satisfactorily completed projects of comparable size using sisal wall coverings in past three (3) years before bidding.
  - d. Upon request, submit documentation and video verification.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver materials in sealed containers with Manufacturer's labels intact.
- B. Storage And Handling Requirements:
  - 1. Store materials in protected area at temperatures below 90 deg F and above 50 deg F. Keep from freezing.
  - 2. Keep container tightly closed in a well ventilated area, and store upright when not in use.
  - 3. Shelf life: One (1) year minimum Unopened containers.

# 1.6 FIELD CONDITIONS

A. Ambient Conditions:

SISAL WALL COVERING - 2 - 09 7226

- 1. Apply when the temperature is between 50 deg F minimum and 100 deg F maximum and relative humidity is less than seventy five (75) percent.
- 2. Provide good ventilation.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide five (5) year warranty against manufacturing defects.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Design Materials Inc, Kansas City, KS www.dmikc.com.
  - 2. Fibreworks, Louisville, KY www.fibreworks.com.

# 2.2 DESCRIPTION

- A. Colors:
  - 1. Category Four Approved Colors. See Section 01 6200 for definitions of Categories.

SCHEME	Design Materials	Fibreworks
Emerald '1'	0280 Emerald	331 Emerald

# 2.3 MATERIALS

- A. Sisal Wall Covering:
  - 1. 100 percent fire-treated sisal yarn.
  - 2. 1/4 inch pile height, 48 oz/sq yd minimum. Sisal to be installed full height on walls shall be furnished in 9 or 13 foot wide goods.
  - 3. Reversible weave type, without backing.

# 2.4 ACCESSORIES

- A. Wall Covering Adhesive:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. 257 Sisal Adhesive by Fibreworks.
    - b. Sisal Adhesive No. 1-422 by Design Materials.
- B. Seam Cement:
  - 1. Type Two Acceptable Products:
    - 8415 Glue-Down Carpet Seam Adhesive by Roberts Consolidated Industries, Div QEP, Henderson, NV www.robertsconsolidated.com.
    - b. Equal as recommended by Wall Covering Manufacturer with approval of Architect before installation. See Section 01 6200.

# PART 3 - EXECUTION

### 3.1 INSTALLERS

A. Acceptable Installers:

1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

# 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify that it is suitable for installation of sisal wall covering.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install over unsuitable conditions.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

# 3.3 INSTALLATION

- A. Apply wall covering in accordance with Manufacturer's instructions, available on DVD from Owner through Architect. See Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Using specified adhesive, glue continuously to surface to be covered with wall covering. Apply adhesive in accordance with Manufacturer's recommendations.
- C. Run 'ribs' in weaving horizontally (panel style) when installing wall covering full height. If sisal installed only as wainscoting, 'ribs' may be installed vertically. Install wall covering so it extends to within 1/8 inch of floor slab.
- D. Carry sisal around corners approximately 6 inch making no outside corner cuts.
- E. Apply wall covering in one piece on walls adjacent to stairs leading to Platform to avoid unsightly and challenging seams.

**END OF SECTION** 

SISAL WALL COVERING - 4 - 09 7226

# SECTION 09 7314 ACOUSTIC WALL COVERINGS - Grille Material

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Products Furnished But Not Installed Under This Section:
    - a. Grille Material used at Organ Chamber.
- B. Related Requirements:
  - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for:
    - a. Installation of Grille Material.
    - b. Furnishing and installation of Mesh Reinforcing installed behind Grille Material.

#### 1.2 REFERENCES

#### A. Definitions:

- Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723:
  - a. Flame Spread: The propagation of flame over a surface.
  - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
  - c. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.

#### B. Reference Standards:

- 1. ASTM International:
  - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
- 2. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2015 Edition).
  - b. NFPA 255: 'Standard Method of Test of Surface Burning Characteristics of Building Materials', (2006 Edition).
  - c. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls', (2015 Edition).
- 3. Underwriters Laboratories, Inc.:
  - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (Tenth Edition, Sep 2008).
  - b. UL 6500, 'Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use' (Second Edition, Sep 1999).

# 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Certified test reports showing compliance with specified performance characteristics and physical properties for Quality Assurance.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's test reports.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: Provide material with surface burning characteristics as determined by testing identical products by qualified testing agency.
    - a. Surface-Burning Characteristics:
      - Grille Material shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type
        - Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.

#### PART 2 - PRODUCTS

# 2.1 MATERIAL

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Acoustone Grille Cloth by Acoustone Corp, Brooklyn, NY www.acoustonegrillecloth.com.
    - b. Mellotone by Wendell Fabrics Corp., Blacksburg, SC www.wendellfabrics.com.
- B. Grille Material:
  - 1. Design Criteria:
    - a. Transparency to Sound.
      - 1) Fully accredited testing lab for sound transmissibility.
    - b. Sound Absorption.
    - c. Meet Fire-Test-Response Characteristics of Quality Assurance as specified in Part 1 of this specification.
    - d. Withstands Mildew and Dust.
    - e. Non Sag.
  - 2. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - a. Acoustone Grille Cloth:
      - 1) FR94\*, FR248, FR250, FR260, FR270\*, FR 280, FR345\*, FR360\*, FR401, FR407, FR602\*, FR605, FR900\*, FR901, FR902\*, FR903\*, FR 905, FR1000, FR1003, FR1004, FR1005, FR1010, FR 3402, FR3403, FR7000, FR7001\*, FR7002, FR7003\*, FR7004\*, FR7006\*, FR7007, FR7008, FR7010\*, FR7012, FR7013\*, or FR7015\* (patterns noted with asterisk are not listed on manufacturer webpage, but all fabrics samples are available from manufacture).
    - b. Mellotone
      - DA 5004, DA 5005, DA 5006, DF 6002, DF 6003, or DF 6004 (pattern samples available from manufacture).

#### PART 3 - EXECUTION Not Used

# SECTION 09 8413 FIXED SOUND-ABSORPTIVE PANELS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Factory-built acoustic (sound-absorptive) wall panels.
  - 2. Sisal wall covering.

# B. Related Requirements:

- 1. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.
- 2. Section 09 7226: 'Sisal Wall Coverings' for quality of sisal wall covering.

#### 1.2 REFERENCES

#### A. Definitions:

- 1. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
  - a. Flame Spread: The propagation of flame over a surface.
  - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or III 723.
  - Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.

## B. Reference Standards:

- ASTM International:
  - a. ASTM C423-17, 'Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method'.
  - b. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - c. ASTM E795-16, 'Standard Practices for Mounting Test Specimens During Sound Absorption Tests'.
- 2. International Building Code (IBC) (2015 or latest approved edition):
  - a. Chapter 8, 'Interior Finishes':
    - 1) Section 803, 'Wall And Ceiling Finishes':
      - a) 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
      - b) 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
- 3. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2015 or latest approved edition).
- 4. Underwriters Laboratories, Inc.:
  - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 Tenth Edition).

#### 1.3 ADMINISTRATIVE REQUIREMENTS

# A. Coordination:

 Contact Installer of Section 07 7226 for Sisal Manufacturer selected for Project to be used on Sound Panels. If available, use same lot number product.

# 1.4 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's literature showing compliance with Contract Document requirements.

- b. Color selection.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - Certified test reports showing compliance with specified performance characteristics and physical properties for Quality Assurance.
  - 2. Manufacturer Instructions:
    - a. Written copy of installation instructions including method of attachment.
    - b. Written copy of cleaning and maintenance instructions.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Cleaning and maintenance instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature.
        - b) Color selection.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Wall covering shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
    - a. Class A (Flame spread index 0-25; Smoke-developed index 0-450).
  - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system.
    - a. Room Corner Tests:
      - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.3.1, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'. (formally UBC 8-2).
      - IBC 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
      - 4) NFPA 265, 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls'.
      - 5) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver in Manufacturer's original, unopened package(s).
- B. Storage And Handling Requirements:
  - 1. Provide secure location protected from the weather and other trades.

# 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide five (5) year warranty against manufacturing defects and workmanship.
  - 2. Warranty to begin at date of Substantial Completion.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

A. Category Four Approved Products. See Section 01 6200 for definitions of Categories.

- 1. Boomer IV Model 14AF3FW by A & D Specialties Inc., Leadore, ID www.a-d-acousticalpanels.com.
- 2. Model CWP by Building Products distributed by Creative West, Salt Lake City, UT www.creativewest.com.

# 2.2 MANUFACTURED UNITS

- A. Design Criteria:
  - 1. Meet Class A flame spread rating.
  - 2. Meet Sound Absorption and Sound Absorption Coefficient requirements as specified in Source Quality Control in this specification.

# B. Sound Panels:

- 1. Factory-built panels covered with woven sisal provided by same Manufacturer selected and specified in Section 09 7226, without backing.
- 2. Nominal 3 inch depth with 2 inches of 1-1/2 lb density fiberglass insulation behind one inch of Tectum or Whisper Foam Sound Management Foam by Dow.
- 3. Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
  - a. Select pre-set color scheme selected in Section 09 7226.

# 2.3 ACCESSORIES

- A. Mounting Hardware:
  - 1. Supply proper mounting hardware for substrate on which sound panels are to be mounted.
- B. Wall Covering Adhesive:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. Products selected by Manufacture meeting sustainable design requirements.

### 2.4 SOURCE QUALITY CONTROL

- A. Tests And Inspections:
  - 1. Sound Absorption and Sound Absorption Coefficient testing:
    - Sound Panel tested for sound absorption and sound absorption coefficients by Reverberation Room Method as determined by ASTM C423 and ASTM E795 as follows:
      - 1) Noise Reduction Coefficient (NRC): 0.85\_minimum.

## PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine substrate and verify that it is suitable for installation of sound panels.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install over unsuitable conditions.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

#### 3.2 INSTALLATION

- A. Factory Installation:
  - 1. Sisal:
    - a. Using specified adhesive, glue continuously to surface to be covered with wall covering. Apply adhesive in accordance with Adhesive Manufacturer's recommendations.
    - b. Run 'ribs' in weaving horizontally (panel style) to match direction of sisal installed full height on wall directly behind panels as specified in Section 09 7226 'Sisal Wall Covering'.

# B. Field Installation:

1. Follow Manufacturer's written installation instructions for layout, plumb, and attachment to substrate with supplied fasteners.

# 3.3 CLEANING

# A. General:

1. Clean any soiling of sound panels as recommended by Manufacturer or any surrounding areas caused by installation of sound panels.

# B. Building Damage:

1. Installer responsible for cleaning and repair of all damaged surfaces to their original condition from sound panel installation.

# C. Waste Management:

- 1. All work areas are to be kept clean, clear and free of debris at all times.
- 2. Disposal of rubbish, debris, and packaging materials to Dumpster.

#### 3.1 PROTECTION

# A. General:

 Upon completion of sound panel installation, protect sound panels from damage and replace or repair subsequent damage at no cost to Owner.

# SECTION 09 9001 COMMON PAINTING AND COATING REQUIREMENTS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common procedures and requirements for field-applied painting and coating.
- B. Related Requirements:
  - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
  - 3. Section 09 6466: 'Wood Athletic Flooring' for finishing of hardwood flooring and painting of game lines.
  - 4. Sections under 09 9000 heading 'Paints and Coatings'.
    - a. Pre-Installation conferences held jointly with Section 09 9001.
  - 5. Divisions 22 and 23: Painting of plumbing and HVAC identification, refrigerant line insulation, and duct interiors.
  - 6. Section 32 1723: 'Pavement Marking'.

#### 1.2 REFERENCES

#### A. Definitions:

- Damage Caused By Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
- 2. Gloss Levels:
  - a. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.

Gloss Level '1'	Traditional matte finish - flat	0 to 5 units at 60 degrees to 10 units maximum at 85 degrees.
Gloss Level '2'	High side sheen flat -'velvet- like' finish	10 units maximum at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '3'	Traditional 'eggshell-like finish	10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '4'	'Satin-like' finish	20 to 35 units at 60 degrees and 35 units minimum at 85 degrees.
Gloss Level '5'	Traditional semi-gloss	35 to 70 units at 60 degrees.
Gloss Level '6'	Traditional gloss	70 to 85 units at 60 degrees.
Gloss Level "7"	High gloss	More than 85 units at 60 degrees.

# 3. Properly Painted Surface:

- a. Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).
- 4. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

# B. Reference Standards:

- 1. The latest edition of the following reference standard shall govern all painting work:
  - a. MPI(a), 'Architectural Painting Specification Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
    - Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
    - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
    - c. Conference to be held at same time as Section 09 2900 to review gypsum board finish preparation.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review Quality Assurance for Approval requirements.
    - b. Review Quality Assurance Field Sample requirements.
    - c. Review Submittal requirements for compliance for MPI Approved Products.
    - d. Review Design Criteria requirements.
    - e. Review Cleaning requirements.
    - f. Review painting schedule.
    - g. Review safety issues.
  - 3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Include following information for each painting product, arranged in same order as in Project Manual.
      - 1) Manufacturer's cut sheet for each product indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
      - 2) Provide one (1) copy of 'MPI Approved Products List' showing compliance for each MPI product specified.
        - MPI Information is available from MPI Approved Products List using the following link: http://www.paintinfo.com/mpi/approved/index.shtml.
      - 3) Confirmation of colors selected and that each area to be painted or coated has color selected for it.
  - 2. Samples: Provide two 4 inch by 6 inch minimum draw-down cards for each paint or coating color selected for this Project.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.
  - 2. Qualification Statement:
    - a. Applicator:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's cut sheet for each component of each system.
        - b) Schedule showing rooms and surfaces where each system was used.
- D. Maintenance Materials Submittals:
  - 1. Extra Stock Materials:
    - a. Provide painting materials in Manufacturer's original containers and with original labels in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life.
    - Provide one (1) quart of each finish coat and one (1) pint of each primer and of each undercoat in each color used.

#### 1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approval:

- Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
- 2. Paint and painting materials shall be free of lead and mercury and have VOC levels acceptable to local jurisdiction.
- 3. Master Painters Institute (MPI) Standards:
  - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
  - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.

### B. Qualifications:

- 1. Applicator: Requirements of Section 01 4301 applies, but not limited to following:
  - a. Minimum five (5) years' experience in painting installations.
  - b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
  - c. Maintain qualified crew of painters throughout duration of the Work.
  - d. Upon request, submit documentation.

#### C. Field Samples:

- 1. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
- 2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
- 3. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container.
  - 2. Deliver amount of materials necessary to meet Project requirements in single shipment.
  - 3. Notify Architect two working days before delivery of coatings.
- B. Storage And Handling Requirements:
  - 1. Store materials in single place.
  - 2. Keep storage area clean and rectify any damage to area at completion of work of this Section.
  - 3. Maintain storage area at 55 deg F minimum.

# 1.7 FIELD CONDITIONS

#### A. Ambient Conditions:

- 1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product for both interior and exterior work.
- 2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted.
  - a. Inspection of painting work shall take place under same lighting conditions as application.
  - b. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Performance:
  - 1. Design Criteria:

- a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
- All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
- d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- e. Where specified paint system does not have Premium Grade, provide Budget Grade.
- f. Provide products of same manufacturer for each coat in coating system.
- g. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- h. Color Levels:
  - 1) Color Level II:
    - a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
    - b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
  - 2) Color Level III:
    - a) Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
    - Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.

#### B. Materials:

- Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
- Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating
  materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in
  MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on
  Project.

# PART 3 - EXECUTION

#### 3.1 APPLICATORS

- A. Approved Applicators:
  - 1. Meet Quality Assurance Applicator Qualifications as specified in Part 1 of this specification.

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.
- B. Pre-Installation Testing:
  - 1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
  - 2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.
  - 3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.

#### C. Evaluation And Assessment:

Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

#### 3.3 PREPARATION

- A. Protection Of In-Place Conditions:
  - 1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
    - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
    - b. Keep cones of ceiling speakers completely free of paint. In all cases where painting of metal speaker grilles is required, paint without grilles mounted to speakers and without grilles on ceiling.

#### B. Surface Preparation:

- 1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
- 2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
- 3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
- 4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
- 5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

# 3.4 APPLICATION

- A. Interface With Other Work:
  - 1. Coordinate with other trades for materials and systems that require painting before installation.
  - Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.
- B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
  - 1. Finish casework and wood trims that are specified to be installed under Section 06 2001 and that are not called out to be factory-or shop-finished. Back prime wood elements to be installed against concrete or masonry or that may be subjected to moisture.
  - 2. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
    - a. Gas pipe from gas meter into building.
    - b. Mechanical flues and pipes penetrating roof.
    - c. Electrical panel and disconnect enclosures.
    - d. Metal protective structures for refrigerant lines.
  - 3. Paint inside of chases in occupied spaces flat black for 18 inches or beyond sightline, whichever is greater.
  - 4. Paint surfaces in organ chamber behind grille cloth with flat black paint.
- C. Apply sealant in gaps 3/16 inch and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.
- D. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.
- E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- G. Touch up suction spots after application of first finish coat.
- H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

- J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

# 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
  - Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

#### 3.6 CLEANING

- A. General:
  - 1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- B. Waste Management:
  - Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
  - 2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
  - 3. Remove debris caused by work of paint Sections from premises and properly dispose.
  - 4. Retain cleaning water and filter out and properly dispose of sediments.

# SECTION 09 9112 EXTERIOR PAINTED FERROUS METAL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting new exterior ungalvanized iron and steel surfaces as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved.
- B. Description:
  - 1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system.
- C. Design Criteria:
  - 1. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
  - 2. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
  - 3. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
  - 1. All paints and coatings.
    - a. Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
    - b. Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).

# PART 3 - EXECUTION

# 3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.

# SECTION 09 9113 EXTERIOR PAINTED GALVANIZED METAL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting new exterior exposed galvanized metal surfaces as Described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Exposed Miscellaneous Structural Steel:
    - a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.
  - 2. All Others
    - a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.
- C. Performance:
  - 1. Design Criteria:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:

#### Polyurethane:

- a. Vinyl Wash Primer Coat: MPI Product 80: 'Primer, Vinyl Wash'.
- b. Finish Coats:
  - 1) Epoxy MPI Product 101: 'Primer, Epoxy, Anti-Corrosive, for Metal'.
  - 2) Polyurethane MPI Product 72: 'Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)'.
- 2. Latex:
  - a. Waterborne Primer Coat: MPI Product 134: 'Primer, Galvanized, Water Based'.
  - b. Finish Coats: MPI Product 11: 'Latex, Exterior Semi-Gloss (MPI Gloss Level 5)'.

# PART 3 - EXECUTION

# 3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces:
  - 1. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP1.
  - 2. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.
  - 3. Apply prime coat.
  - 4. Apply finish coats.

# SECTION 09 9114 EXTERIOR PAINTED CMU, CONCRETE, STUCCO

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting new exterior CMU and concrete surfaces as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Performance:
  - 1. Finish Requirements:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Gloss / Sheen Level Required: Gloss Level 1.
- C. Materials:
  - 1. Finish Coats: MPI Product 10: 'Latex, Exterior Flat (MPI Gloss Level 1-2)'.

# PART 3 - EXECUTION

# 3.1 PREPARATION

A. Except for steam cured products, cure cement type surfaces from 60 to 90 days in accordance with Paint Manufacturer's recommendations before painting.

# 3.2 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces:
  - 1. On highly porous surfaces when weather is exceptionally hot and dry, it may be desirable to dampen surface before applying first coat of an emulsion paint.
  - 2. Completely cover voids in masonry block.
  - 3. Roll after spraying if necessary to eliminate pinholing.

# SECTION 09 9121 INTERIOR PAINTED POURED CONCRETE

# PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting of new concrete floors to be left exposed in finished building, as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

#### PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. New Surfaces: Use MPI(a) INT 3.2A Latex Finish system
  - 2. Finish Requirements: Use MPI Custom Grade finish requirements.
- C. Performance:
  - 1. Design Criteria:
    - a. Gloss / Sheen Level Required: Semi-Gloss.
- D Materials
  - 1. MPI Product 60: 'Floor Paint, Latex, Low Gloss'.

#### PART 3 - EXECUTION

# 3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

# SECTION 09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing, priming, and finish painting new interior gypsum board and plaster surfaces as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for:
    - a. Priming new interior gypsum board surfaces to receive sheet wall covering system or texturing.
    - b. Pre-installation conference.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
  - 3. Section 09 9413: 'Interior Textured Finishing' for textured finishes.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 2900.
    - a. In addition to agenda items specified in Section 01 3100 and Section 09 2900, review following:
      - 1) Review finish level requirements of gypsum wallboard as specified in Section 09 2900.
  - 2. Participate in pre-installation conference as specified in Section 09 9001.

## PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Rest Rooms, Font Rooms, And Custodial Rooms:
    - a. New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.
  - 2. All Others
    - a. New Surfaces: Use MPI(a) INT 9.2B Latex Finish system.
- C. Performance:
  - 1. Design Criteria:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Gloss / Sheen Required:
      - 1) Rest Rooms And Custodial Rooms: Gloss Level 6.
      - 2) Font Room: Gloss Level 6.
      - 3) Chapel Ceiling: Gloss Level 1 or 2.
      - 4) Remaining Painted Surfaces: Gloss Level 5.
- D. Materials:
  - 1. Primers:

- a. MPI Product 50, 'Primer Sealer, Latex, Interior'.
- 2. Finish Coats:
  - a. Rest Rooms, Font Room, And Custodial Rooms:
    - 1) Buildings with only Gypsum Board surfaces in rooms:
      - a) MPI Product 115, 'Epoxy-Modified Latex, Interior, Gloss (MPI Gloss Level 6)'.
  - b. Chapel Ceiling:
    - 1) MPI Product 53, 'Latex, Interior, Flat (MPI Gloss Level 1)'.
  - c. Remaining Painted Surfaces:
    - 1) MPI Product 141, 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)'.

#### PART 3 - EXECUTION

# 3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Interface With Other Work: Properly clean and paint light cove interiors before installation of light fixtures.
- C. New Surfaces:
  - 1. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.

# SECTION 09 9124 INTERIOR PAINTED METAL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting new interior metal surfaces as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 05 5871: 'Metal Brackets'.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
  - 3. Section 23 0553: 'I. D. For HVAC Piping And Equipment' for field painting requirements of HVAC piping and equipment.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
- B. Sequencing:
  - 1. Paint brackets furnished under Section 05 5871 before installation of bracket.

# PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Ferrous Metal:
    - a. New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
  - 2. Galvanized Metal:
    - a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system
- C. Performance:
  - 1. Design Requirements:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
  - 1. Primers:
    - a. Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
    - b. Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
  - 2. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

# PART 3 - EXECUTION

# 3.1 APPLICATION

- A. General:
  - 1. See appropriate paragraphs of Section 09 9001.
  - 2. Systems specified are in addition to prime coats furnished under other Sections.
- B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

END OF SECTION

INTERIOR PAINTED METAL - 2 - 09 9124

# SECTION 09 9125 INTERIOR PAINTED WOOD

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and painting new woodwork and wood floors not requiring transparent finish, as described in Contract Documents
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Systems:
    - a. Floors:
      - 1) New Surfaces: Use MPI(a) INT 6.5H Waterborne Epoxy Finish system.
    - b. All Other
      - 1) New Surfaces: Use MPI(a) INT 6.3T or U Latex Finish system.
- C. Performance:
  - 1. Design Criteria:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
  - Wood Floors:
    - a. Low to medium traffic: MPI Product 60, 'Floor Paint, Latex, Low Gloss'.
  - 2. Woodwork:
    - a. Primer Coat: MPI Product 39, 'Primer, Latex, for Interior Wood' or MPI Product 45, 'Primer Sealer, Alkyd, Interior'.
    - b. Finish Coats: MPI Product 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

# PART 3 - EXECUTION

# 3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Interface With Other Work:
  - 1. Properly clean and paint light cove interiors before installation of light fixtures.
  - 2. Where back-priming is required, apply one (1) coat of primer.
- C. New Surfaces:
  - 1. Spot prime nail holes, cracks, and blemishes before and after puttying.
  - 2. Apply stain blocker or other product recommended by Paint Manufacturer to knots before applying primer coat.

# END OF SECTION

INTERIOR PAINTED WOOD - 2 - 09 9125

# SECTION 09 9324 INTERIOR CLEAR-FINISHED HARDWOOD

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Preparing and finishing of new interior clear finished hardwood as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 2210: 'Miscellaneous Wood Trim'.
  - 2. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets'.
  - 3. Section 06 4115: 'Rostrum Casework'.
  - 4. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 5. Section 08 1429: 'Interior Flush Wood Doors'.
  - 6. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
  - 7. Section 12 6713: 'Pews'.

# 1.2 REFERENCES

- A. Reference Standards:
  - 1. Kitchen Cabinet Manufacturers Association / American National Standards Institute:
    - a. ANSI/KCMA A161.1-2000 (R2005) 23-Jan-2001 'Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets.'

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
    - a. Review control sample(s).

# 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - 1) Requirements for samples are specified in Related Requirement Sections listed above.
    - b. Design Criteria:
      - 1) Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Before beginning finish work, submit Finish Manufacturer's literature or certification that finish material meets requirements of ANSI / KCMA A161.1.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Materials:
  - 1. Design Criteria:
    - a. See appropriate paragraphs of Section 09 9001.
  - 2. Stain: MPI 90, 'Stain, Semi-Transparent, for Interior Wood'.
  - 3. Clear Finish Coats:
    - a. Field Finished:
      - 1) Chemcraft International Inc:
        - a) First, Second, And Third Coats: 20 Sheen Opticlear Pre-Catalyzed Lacquer.
      - 2) ICI Dulux / Trinity:
        - a) First Coat: ICE Vinyl Sanding Sealer.
        - b) Second And Third Coats: ICI Pre-Catalyzed Lacquer.
      - 3) Lilly / Valspar:
        - a) First, Second, And Third Coats: 20 Sheen Pre-Catalyzed Lacquer 587E208.
      - 4) Sherwin-Williams:
        - a) First Coat: T67F3 Vinyl Sealer.
        - b) Second And Third Coats: T77F38 Sherwood Pre-Catalyzed Lacquer DRE.
    - b. Mill Finished: Architectural Woodwork finished in a mill may use one (1) coat of Vinyl Sealer and two (2) coats of Conversion Varnish or three (3) coats of Conversion Varnish from one (1) of the approved Finish Manufacturers, as recommended by Finish Manufacturer.
    - c. Products meeting testing requirements for finishes of ANSI / KCMA A161.1 may be used upon approval of submission by Architect before use. See Section 01 6200.
  - 4. Color:
    - a. Design Criteria:
      - 1) Finish to match Owner selected sample.
    - b. LDS Cherry:
      - 1) Performance standard: Owner provided sample.
        - a) Contact Information: Nancy Black (801) 240-2431 BlackNL@ldschurch.org, Meetinghouse Facilities Department.
      - 2) Elective finishing process:
        - a) Class Two products: See Section 01 6200 for definitions of Categories.
          - (1) LDS Cherry stain: S4XXR1093 by Sherwin Williams.
          - (2) Sealer: V81FH4 by Sherwin Williams.
        - b) Option One Toner:
          - (1) Toner: T7XXN11343 by Sherwin Williams.
        - c) Option Two Toner:
          - (1) 1 qt cherry stain.
          - (2) 2 qts sealer.
          - (3) 6 qts lacquer thinner.
          - (4) Red oxide 42.8 grams.
          - (5) Black 25.0 grams.
          - (6) Medium yellow 30 grams.
        - d) Finish:
          - (1) Finish: V84FF8007 by Sherwin Williams.
        - e) Application:
          - (1) Use quart spray pot. Apply gently and lightly to surface.
          - (2) Use control sample at all times.
          - (3) Spray on stain and let stand five (5) minutes before wiping off. Let dry sixteen (16) hours (or overnight).
          - (4) Use sealer and let dry one (1) hour.
          - (5) Buff surfaces with 220 grit sanding sponge blocks.
          - (6) Blow off dust.
          - (7) Spray on toner (let dry thirty (30) minutes minimum).
          - (8) Spray on finish.

# 3.1 APPLICATION

# A. General:

- 1. See appropriate paragraphs of Section 09 9001.
- 2. Sand entire exposed surface of item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
- 3. Apply stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
- 4. Scuff sand with 220 non-stearated sandpaper between application of application stain and first finish coat.
- 5. If wood is finished before installation, finish cut ends and other unfinished, exposed surfaces same as previously finished surfaces after installation of wood.
- B. Where back-priming is required, apply one coat of finish material.
- C. Architectural Woodwork Door Surfaces (cabinetry doors only):
  - 1. Finish tops, bottoms, and edges before faces.
  - 2. Finish architectural woodwork doors with no hardware applied to doors.

# SECTION 09 9413 INTERIOR TEXTURED FINISHING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and apply texturing on walls and ceilings as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for priming.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements' for:
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
  - 3. Section 09 9123: 'Interior Painted Gypsum Board, Plaster' for finish painting.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Drywall Texture: Compound rolled, sprayed, or troweled onto sheetrock after taping and floating of joints is complete. Uses same material as joint compound, but thinned down with water and applied to wall surface:
    - a. Light Orange Peel: Sprayed texture leaves light splatter on walls. Resembles peel of orange. If done with fine spray, can be one of the lightest, least noticeable of the texture styles.
    - b. Light Skip Trowel Texture is applied to ceilings with trowel. Trowel marks may be left on surface to give a rustic, hand crafted look.
    - c. Smooth Smooth application of texture over sheetrock wall that feathers out sheetrock joints, and creates even, non-textured wall.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
    - a. Review control samples.

### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. Light Orange Peel Texture:
      - 1) Provide minimum of three (3) 24 inch square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
    - b. Light Skip Trowel Texture:
      - 1) Provide minimum of three (3) 24 inch square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.

## 1.5 QUALITY ASSURANCE

- A. Field Samples:
  - 1. Before performing work of this Section, prepare control samples.
  - Architect will inspect control sample at pre-installation conference following preparation of control sample. When sample is approved, work of this Section may proceed. Approved samples will be kept at site at all times work of this section is being performed.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. National Gypsum, Charlotte, NC www.nationalgypsum.com.
    - b. U S Gypsum Co, Chicago, IL www.usg.com.
- B. Materials:
  - Class Two Quality Standards: See Section 01 6200.
    - a. ProForm Perfect Spray EM/HF by National Gypsum.
    - b. Sheetrock Wall & Ceiling Texture by U S Gypsum.

#### PART 3 - EXECUTION

#### 3.1 APPLICATION

- A. Location:
  - 1. Walls:
    - a. Light Orange Peel Texture:
      - 1) All areas except those listed in following paragraph.
    - b. Smooth:
      - 1) Mechanical Rooms, Storage Rooms, and other Utility Areas.
  - 2. Ceilings:
    - a. Light Skip Trowel Texture:
      - 1) Foyers (including soffits of light cove).
      - 2) Platform.
      - 3) Vestibules.
      - 4) All other locations not indicated elsewhere.
    - b. Smooth Finish (no applied texture) to be applied to the following ceilings:
      - 1) Font
      - 2) Mechanical Rooms, Storage Rooms, and other Utility Areas.
      - 3) Restrooms.
      - 4) Serving Area.

# B. Finishing:

- 1. Light Orange Peel Texture:
  - a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
    - 1) After wall has been textured, apply priming and finish paint as specified in Section 09 9123.
- 2. Skip Trowel Texture:
  - a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
    - 1) After wall has been textured, apply priming and paint as specified in Section 09 9123.
- Smooth:
  - a. No applied texture is required. Apply priming and paint as specified in Section 09 9123.

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# **DIVISION 10 - SPECIALTIES:**

10 1000 10 1113 10 1116 10 1123 10 1200 10 1424 10 1453 10 1495 10 2000 10 2113	Information Specialties Fixed Chalkboards Fixed Markerboards Fixed Tackboards Display Cases Engraved Stone Panel Signage Traffic Signage Miscellaneous Interior Signage Interior Specialties
10 2233 10 2813 10 2814	Metal Toilet Compartments Accordion Folding Partitions Commercial Toilet Accessories Miscellaneous Interior Signage
10 4000	Interior Specialties
10 4400 10 5000 10 5713 10 7000 10 7430	Fire Protection Specialties Storage Specialties Hat and Coat Racks Exterior Specialties Aluminum Steeple

DIVISION 10 SPECIALTIES

# SECTION 10 1113 FIXED CHALKBOARDS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - 1. Chalkboards and specified hardware: Visual Display Board Type 1.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish Chalkboards. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking.
  - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

#### 1.2 SUBMITTALS

- A. Informational Submittals:
  - Manufacturer Instructions:
    - a. Published installation instructions.
    - b. Printed cleaning instructions.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance instructions.
      - 2) Printed cleaning instructions.
    - b. Warranty Documentation:
      - 1) Manufacturer Warranty.
    - c. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's product literature.
        - b) Color selections.

#### 1.3 WARRANTY

- A. Manufacturer Warranty:
  - Letter from Manufacturer certifying Contract Documents have been complied with and guarantee against faulty workmanship and materials for five years.

## PART 2 - PRODUCTS

# 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Fixed Chalkboard:
  - 1. Color: Dark Gray.
  - 2. Mounting Hardware: Suitable for wall conditions.

# 3.1 INSTALLATION

- A. Mount boards square and level.
  - 1. Shim as necessary to provide permanent installation and smooth operation.
  - 2. Anchor boards securely to wall following Manufacturer's written installation instructions.
  - 3. Anchor concealed hangers with screws at 24 inches on center.
- B. Mounting fasteners shall penetrate framing lumber or blocking 1-1/2 inch minimum.
- C. After attaching map clips, apply permanently attached end cap or screw to prevent removal of map clips.

# END OF SECTION

FIXED CHALKBOARDS - 2 - 10 1113

# SECTION 10 1116 FIXED MARKERBOARDS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Supplied Under This Section:
  - 1. Markerboard units: Visual Display Board Type 3.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish Markerboards. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking.
  - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

#### 1.2 SUBMITTALS

- A. Informational Submittals:
  - Manufacturer Instructions:
    - a. Published installation instructions.
    - b. Printed cleaning instructions.
- B. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance instructions.
      - 2) Printed cleaning instructions.
    - b. Warranty Documentation:
      - 1) Manufacturer Warranty.
    - c. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's product literature.

# 1.3 WARRANTY

- A. Manufacturer Warranty:
  - 1. Letter from Manufacturer certifying Contract Documents have been complied with and guarantee against faulty workmanship and materials for five (5) years.

#### PART 2 - PRODUCTS

## 2.1 OWNER FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Fixed Markerboard:
  - 1. Coatings shall meet requirements of PEI-1002:
    - a. All Rooms:
      - 1) Coatings shall be for marker use.
  - 2. Color: White.
  - 3. Mounting Hardware: Suitable for wall conditions.

# 3.1 INSTALLATION

- A. Mount boards square and level.
  - 1. Shim as necessary to provide permanent installation and smooth operation.
  - 2. Anchor boards securely to wall following Manufacturer's printed installation instructions.
  - 3. Anchor concealed hangers with screws at 24 inches on center.
- B. Mounting fasteners shall penetrate framing lumber or blocking 1-1/2 inch minimum.
- C. After attaching map clips, apply permanently attached end cap or screw to prevent removal of map clips.

# END OF SECTION

FIXED MARKERBOARDS - 2 - 10 1116

# SECTION 10 1123 FIXED TACKBOARDS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Supplied Under This Section:
  - 1. Tackboards and specified hardware: Visual Display Board Type 2.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish Markerboards. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking.
  - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

#### 1.2 SUBMITTALS

- A. Informational Submittals:
  - Manufacturer Instructions:
    - a. Published installation instructions.
    - b. Printed cleaning instructions.
- B. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance instructions.
      - 2) Printed cleaning instructions.
    - b. Warranty Documentation:
      - 1) Manufacturer Warranty.
    - c. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's product literature.
        - b) Color selection.

#### 1.3 WARRANTY

- A. Manufacturer Warranty:
  - Letter from Manufacturer certifying Contract Documents have been complied with and guarantee against faulty workmanship and materials for five years.

## PART 2 - PRODUCTS

# 2.1 OWNER FURNISHED PRODUCTS

- A. Manufacturer:
  - 1. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Fixed Tackboard:
  - 1. Color:
    - a. Sterling
    - b. Mounting Hardware: Suitable for wall conditions.

# 3.1 INSTALLATION

- A. Mount boards square and level.
  - 1. Shim as necessary to provide permanent installation.
  - 2. Anchor boards securely to wall following Manufacturer's printed installation instructions.
  - 3. Anchor concealed hangers with screws at 24 inches on center.
- B. Mounting fasteners shall penetrate framing lumber or blocking 1-1/2 inch minimum.
- C. After attaching map clips, apply permanently attached end cap or screw to prevent removal of map clips.

# END OF SECTION

FIXED TACKBOARDS - 2 - 10 1123

# SECTION 10 1200 DISPLAY CASES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - 1. Visual Display Cabinets: Visual Display Board Type 4.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish Visual Display Cabinets. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking.
  - 3. Section 06 2001: Common Finish Carpentry Requirements' for installation.

#### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide product literature or cut sheet on display cases.
- B. Informational Submittals:
  - Manufacturer Instructions:
    - Published installation instructions.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's product literature.

## 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Identification of safety glazing in accordance with IBC Section 202, 'Definitions' and Section 2406, 'Safety Glazing:
    - a. Apply designation or label as required by code to each pane.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Standard Key Delivery:
    - a. Include keys for locks.

# PART 2 - PRODUCTS

# 2.1 OWNER FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. ADP Lemco Corp, Draper, UT www.adplemco.com.

- B. Missionary Display Cases:
  - 1. Size: 48 inches by 48 inches.
  - 2. Framing: Red Oak pre-finished to match color of architectural woodwork.
  - 3. Sliding Glass Doors: 1/4 inch tempered polished plate.
  - 4. Tackboard: 1/4 inch vinyl impregnated cork laminated to plywood, masonite, or flakeboard base.
  - 5. Locks: Standard of Manufacturer. Provide four (4) keys.
  - 6. Mounting Devices: As furnished by Manufacturer for type of wall to receive case.
  - 7. Approved Product: MBS-44 by ADP Lemco.

## 3.1 INSTALLATION

- A. Mount boards plumb and true.
  - 1. Anchor with mounting devices furnished by Manufacturer following printed installation instructions.

## END OF SECTION

DISPLAY CASES - 2 - 10 1200

# SECTION 10 1424 ENGRAVED STONE PANEL SIGNAGE

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Stone Meetinghouse building sign with Church logo and visitors welcome.
  - 2. Stone building address sign.
- B. Related Requirements:
  - 1. Section 04 2113: 'Brick Veneer Masonry' for installation and cleaning.

#### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Show details of attachment system.
  - Samples:
    - a. Submit stone sample of approved stone type specified by Architect.
- B. Informational Submittals:
  - Approved Stone Type:
    - a. Notify Sign Fabricator of approved stone ten (10) week minimum before installation of sign(s).
  - 2. Stone building address sign:
    - a. Notify Sign Fabricator of correct address that will be used in address ten (10) week minimum before installation of sign.

# 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Sign Fabricator Responsibility:
    - a. Deliver material to site, carefully unload, and check in such manner as to avoid soiling, damaging, or chipping.
    - b. Protect material from damage while in transit to job site.
- B. Storage And Handling Requirements:
  - 1. General Contractor Responsibility:
    - a. Store material on planks clear of ground.
    - b. Protect material from damage, dirt, or disfigurement until installation.

# PART 2 - PRODUCTS

# 2.1 MATERIAL

- A. Fabricators:
  - 1. Category Four Approved Sign Fabricators. See Section 01 6200 for definitions of Categories:
    - a. Hans Monument Co, Salt Lake City, UT www.hansmonuments.com.
      - 1) Contact Information: Debbie Christensen (801) 484-1594 or fax (801) 467-8308.
    - o. Mark H. Bott Co., Ogden, UT www.markbottco.com.
      - 1) Contact Information: David E. Bott (801) 393-8087 or fax (801) 393-8080.

#### B. Stone:

- 1. Description:
  - Stone building sign.
- 2. Design Criteria:
  - Texture and color variation shall be within limits established by Architect's approved sample.
  - b. Monument quality, free of defects that would materially impair strength, durability, and appearance.
- Dimensions:
  - a. Meetinghouse building sign with Church logo and visitors welcome:
    - 1) Approved sign dimension: 34-1/4 inches high by 55-5/8 inches wide by 1-1/4 inch thick as shown on Contract Drawings.
  - b. Stone building address sign:
    - 1) Approved sign dimension: 10-1/4 inches high by 15-5/8 inches wide (width may vary in dimension per numerals used in address) by 1-1/4 inch thick as shown on Contract Drawings.
- 4. Category Four Approved Stone Type. See Section 01 6200 for definitions of Categories:
  - a. Bethel White Granite.
  - b. Elberton Sunset Granite.
  - c. Morning Rose Granite.
  - d. Medium Barre Granite.
- C. Finish: Low pressure, 30 lb, steeled finish on 80 grit honed surface.

#### 2.2 ACCESSORIES

- A. Fasteners And Anchors:
  - 1. Provided by Sign Fabricator for method shown on Contract Documents:
    - a. 'J' bolt system for mounting sign recessed in masonry veneer on framing.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General:
  - 1. Set stone sign using mechanical fasteners provided by Sign Fabricator.
  - 2. Joints shall be 3/8 inch wide. Use plastic spacers in wall joints.
- B. Stone Damage:
  - 1. Installer responsible for repair of damaged surface during installation.

## 3.2 CLEANING

- A. General:
  - 1. After stone sign installation is completed, clean using non-metallic fiber brushes and clean water.

#### 3.3 PROTECTION

- A. General Contractor Responsibility:
  - 1. Provide protection for stone sign(s) from masonry cleaning chemicals and other damaging materials until Substantial Completion.

# SECTION 10 1453 TRAFFIC SIGNAGE

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnishing and installing of exterior post-mounted site signage as described in Contract Documents.
- B. Related Requirements:
  - Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete' for quality requirements of concrete used for parking sign posts.
  - 2. Section 09 9113: 'Exterior Painted Galvanized Metal' for painting signage post.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. International Code Council / American National Standards Institute:
    - a. ICC/ANSI A117.1-2010, 'Accessible and Usable Buildings and Facilities'.
  - 2. U.S. Department of Justice:
    - a. 2010 'ADA Standards for Accessible Design'.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Sign shall meet ANSI A117.1 accessibility code and ADA standards for accessible design and local and state authorities having jurisdiction (AHJ) requirements.

# PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Permanently Mounted:
  - 1. Post Foundation Concrete: One cu ft cement, 2 cu ft sand, 4 cu ft gravel, and 5 gallons minimum to 6 gallons maximum of water.
  - 2. Accessible Parking Signs:
    - a. Design Criteria:
      - 1) Meet regulatory agency requirements for accessibility.
      - 2) Sign graphics and lettering shall be minimum required by agency having jurisdiction:
        - a) International symbol of accessibility should be posted on all accessible parking spaces.
        - b) Letters must contain visual characters and high dark to light contrast between characters and background as per ADA requirements:
        - c) Provide reflective background.
        - d) Van-accessible parking spaces to have additional 'text' or 'sign' below the accessibility symbol to mark the van-accessible area specifically:
      - 3) Size: 8 inches x 8 inches aluminum sign.
      - 4) Sign shall have rounded corners.
    - b. Type Two Acceptable Products:
      - 1) Parking signs by My Parking Sign, Brooklyn, NY www.MyParkingSign.com.
      - 2) Equal as approved by Architect before use. See Section 01 6200.

- 3. Posts:
  - a. Handicap Accessible Parking Signage:
    - 1) Provide galvanized post as shown on Contract Drawings.

#### 3.1 INSTALLATION

- A. Permanently Mounted:
  - 1. Locate as shown on Site Plan.
    - a. Follow ADA guidelines and local and state authorities having jurisdiction (AHJ) for placement of sign requirements:
      - 1) Van accessible sign should be placed so that it is not obscured by anything including a standing van, vehicle or other obtrusive objects.
      - 2) Signs should be placed at such a height (at least 60 inches above surface) that they do not get obscured by any parked vehicles or other obstructions. Signs must be viewable from drivers' seat of vehicle and located right in view of parking spaces.
  - 2. Install signs square and plumb.
  - 3. Post Foundations:
    - a. Follow requirements of Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete' for post foundation:
      - Mix concrete components thoroughly, place in post foundation holes sized as shown on Contract Drawings.
    - b. Mow Strips:
      - 1) At mow strips where shown on Site Plan, set top of post foundation below grade sufficient to allow for placing of mow strip.
  - 4. Handicap Accessible Parking Signage:
    - 1) Attach sign to painted galvanized steel posts as shown on Contract Drawings with stainless steel self tapping screws.
    - 2) Isolate dissimilar materials (steel tube and aluminum sign).

END OF SECTION

TRAFFIC SIGNAGE - 2 - 10 1453

# SECTION 10 1495 MISCELLANEOUS INTERIOR SIGNAGE

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - 1. Owner-furnished interior signs.
- B. Related Requirements:
  - 1. Section 01 6400: Owner will furnish designated interior signs. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.

#### PART 2 - PRODUCTS

# 2.1 OWNER FURNISHED PRODUCTS

- A. Category Four Approved Standard Interior Signs. See Section 01 6200 for definitions of Categories:
  - 1. Visual Identity Office:
    - a. Contact Information:
      - 1) 50 E. North Temple St. Rm. 2350, Salt Lake City, UT 84150-3232.
      - 2) Phone: 1-801-240-1302.
      - 3) Fax: 1-801-240-5997.
      - 4) vidoffice@ldschurch.org.
  - Room Signs: Molded clear acrylic sub-surface graphics sign with set-screw to attach to included mounting bracket.
    - a. Provide tactile / braille features in signage.
  - 3. Cabinet Door Signs: Flat clear acrylic sub-surface graphics sign with mounting adhesive in position.
  - 4. Color:
    - a. Background: Blue.
    - b. Lettering: White.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install interior signs square and plumb:
  - 1. Room Signs:
    - a. Install bracket using two screws. Use proper anchor for substrate.
    - b. Attach sign to bracket using set-screw.
    - c. Mount signs as described in Contract Drawings.
  - 2. Cabinet Signs:
    - a. Remove adhesive protective layer.
    - b. Position sign correctly and apply to door.
    - c. Roll sign to secure to door, taking care not to damage sign.
    - d. Mount signs as described in Contract Drawings.

# SECTION 10 2113 METAL TOILET COMPARTMENTS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install metal toilet compartments as described in Contract Documents.
- B. Related Requirements:
  - Section 06 1100: 'Wood Framing' for blocking in wood framing for compartment installation, ceiling support for urinal partitions, and door bumper.
  - 2. Section 10 2813: 'Commercial Toilet Accessories'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A167-99(2011), 'Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.'
    - b. ASTM A484/A484M-16, 'Standard Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Color selection.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.
        - b) Color selection.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Store and handle in compliance with Manufacturer's instructions and recommendations.

# 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard warranty.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Type One Acceptable Manufacturers:
  - 1. Accurate Partitions Inc, Lyons, IL www.accuratepartitions.com.
  - 2. AMPCO Products Inc, Miami, FL www.ampco.com.
  - 3. Columbia Partitions, Columbia, SC www.psisc.com.
  - 4. Flush-Metal Partition Corp, Maspeth, NY www.flushmetal.com.
  - 5. Global Steel Products Corp, Eastanollee, GA www.globalpartitions.com.
  - 6. Hadrian Inc, Mentor, OH www.hadrian-inc.com.
  - 7. Knickerbocker Partitions Corp, Freeport, NY www.knickerbockerpartition.com.
  - 8. Metpar, Westbury, NY www.metpar.com.
  - 9. Equal as Approved by Architect before bidding. See Section 01 6200.

## 2.2 MANUFACTURED UNITS

- A. Toilet And Miscellaneous Partitions:
  - 1. Floor-mounted, overhead-braced.
  - 2. Panels:
    - a. Galvanized bonderized steel sheets (minimum 0.00015 inch zinc coating).
    - b. Edges bound interlocked with drawn molding welded on corners.
    - c. Corners welded and ground smooth.
    - d. Sound deadening honeycomb core.
    - e. Provide wood blocking on all panels that have grab bars.
    - f. Gauge:
      - 1) Doors: 22 ga minimum.
      - 2) Panels: 22 ga minimum.
      - 3) Pilasters: 22 ga minimum.
      - 4) Screens: 22 ga minimum.
  - Posts:
    - a. 20 ga minimum of same construction and finish as panels.
  - 4. Headrails:
    - a. Aluminum.
    - b. 20 ga minimum of same construction and finish as panels.
    - c. Anti-grip design.
  - 5. Plinths:
    - a. 20 ga Type 304 stainless steel, Number 4 finish.
    - b. 3 inch minimum high, secured with concealed clips.
    - c. All fasteners used to attach Plinths, Posts and Pilasters to the floor shall be Type 304 stainless steel.
  - 6. Anchorages and fasteners:
    - a. Concealed: Non-corrosive, protective finish.
    - b. Tamper resistant Torx Head with pin screws.
  - 7. Hardware:
    - a. Each door:
      - Gravity type hinges with double handed, nylon bottom cam, adjustable for partial door closing position, bottom hinge finished flush with door bottom.
      - 2) Sliding or concealed door bolt with emergency access.
      - 3) Door strike and keeper with rubber bumper.
      - 4) Coat hook / door bumper.
    - b. Finish: Chrome plated.
    - c. Meet requirements of ASTM B86, Alloy AG 40A.

#### B. Urinal Partition:

- 1. Basic construction same as panels above, floor and ceiling mounted.
- 2. Width to be 16 inches minimum.
  - a. Partition maximum width shall not encroach into required accessibility clear floor space.

#### 2.3 FINISHES

- A. Finish And Color:
  - 1. Powder-coated paint finish.
  - 2. Color selected by Architect.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Field verify dimensions.
  - 2. Verify that necessary blocking has been installed in framed walls for partition installation and for place where coat hook / door bumper will strike wall.

#### 3.2 INSTALLATION

- A. Install pilasters rigid, plumb, and level. Maintain proper door openings. Anchor pilaster to floor with Type 304 stainless steel fasteners embedded 2 inches into concrete slab below setting bed.
- B. Secure panels to walls with two stirrup brackets minimum attached near top and bottom of each panel. Use fasteners of length to provide one inch embedment into blocking or masonry.
- C. Secure overhead brace to face sheets with two fasteners minimum per face. Set door tops parallel with brace. Set door bottom 12 inches above floor.
- D. Plinth to be level with and snug to floor.

### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
  - 2. Replace damaged or severely scratched materials with new materials at no additional cost to the Owner.

#### 3.4 ADJUSTING

- A. Lubricate hardware as recommended by Manufacturer.
- B. Set hinges on out-swinging doors to return to nearly closed position.
- C. Perform final adjustments to pilaster leveling devices, door hardware, and other operating parts of partition assembly just before Substantial Completion.

# 3.5 CLEANING

- A. Remove protective masking. Clean exposed surfaces of partitions, hardware, fittings, and accessories.
- Touch-up minor scratches and other finish imperfections using materials and methods recommended by Manufacturer.

# SECTION 10 2233 ACCORDION FOLDING PARTITIONS

## PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes But Is Not Limited To:

 Coordination, sequencing, and scheduling of Owner-Furnished accordion folding partition installation as described in Contract Documents.

# B. Related Requirements:

- Section 01 1200: 'Multiple Contract Summary' for furnishing and installation of accordion folding partitions by Owner. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
- 2. Section 06 1100: 'Wood Framing' for folding door header and framing required to receive accordion folding partitions.
- 3. Section 06 4512: 'Architectural Woodwork Wood Trim' for folding partition hardwood jambs and trim.
- 4. Section 09 9324: Interior Clear-Finished Hardwood' for finishing folding partition hardwood jambs and trim.

#### A. Reference Standards:

- 1. ASTM International:
  - a. ASTM E90-09(2016), 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements'.
  - b. ASTM E336-16a, 'Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings'.
  - c. ASTM E413-16, 'Classification for Rating Sound Insulation'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

## A. Coordination:

- 1. Coordinate efforts of various trades affected by the Work of this Section.
- 2. Coordinate completion of folding partition headers.
  - a. Assure accurate installation of folding partition header(s).
- 3. Coordinate completion of accordion folding partition hardwood jambs and trim.
- 4. Coordinate completion of accordion folding partition installation with sound system testing so acoustic testing of accordion folding partitions may be performed at same time.

## B. Sequencing:

- 1. Install accordion folding partitions after following has been completed:
  - a. Folding partition headers and adjacent walls and ceilings are finished and painted.
  - b. Hardwood jambs and trim installed and finished.
  - c. Carpet flooring has been installed.
  - d. If athletic wood flooring is included with Project, flooring has been installed and properly cured which is usually thirty (30) days.

# C. Scheduling:

- 1. Notify #1:
  - a. Notify Manufacturer when folding partition headers are installed and ready for field measurement.
    - 1) Receipt of Notification shall be eight (8) weeks minimum before start of installation of accordion folding partitions.
- 2. Notify #2:
  - Notify Manufacturer two (2) weeks minimum before scheduled start of installation of accordion folding partitions.
- 3. Notify #3:
  - a. If schedule has changed since Notify #2, notify Manufacture of new schedule for coordination of delivery and installation of accordion folding partitions.
- 4. Installation of accordion folding partitions should be completed within fourteen (14) days of commencement.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet.
    - b. Color and style selections.
- B. Informational Submittals:
  - 1. Manufacturer Instruction:
    - a. Manufacturer's accordion folding partition installation details.
  - 2. Manufacturer Reports:
    - a. Provide letter certifying that installation is complete and ready for acoustic testing.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Manufacturer's maintenance instructions.
      - 2) Maintenance and repair box with spare parts.
    - b. Warranty Documentation:
      - Include copy of final, executed warranty / Certificate stating that installed materials comply with specification.
    - c. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature.
        - b) Color selections.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Sound rated partitions shall have laboratory sound rating indicated, when tested in accordance with requirements
    of ASTM E90.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to the following:
  - Installation shall be performed by Manufacturer trained or authorized personnel according to Manufacturer's installation instructions.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements: Requirements of Section 01 6600 applies, but not limited to the following:
  - 1. General:
    - a. Delivery is preferred to coincide with accordion folding partition installation.
  - 2. Contractor's Responsibility:
    - a. Supervise unloading and handling.
  - . Owner-Furnished Product Manufacturer's Responsibility:
    - a. Deliver in Manufacturer's original, unopened package(s).
    - b. Handling and unloading.
    - c. Delivery shall be no more than fourteen (14) days before start of installation of accordion folding partitions.
    - d. Replace damaged materials at no cost to Owner.
- B. Storage And Handling Requirements:
  - 1. Contractor's Responsibility:
    - a. Provide secure location protected from weather and other trades.
  - 2. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Store boxes flat no more than four (4) high.

#### 1.7 WARRANTY

- A. Special Warranty:
  - 1. Manufacturer's covering installation and complete accordion folding partition assembly.

- a. Warranty covers defects in manufacture and installation of accordion folding partitions, which will not allow them to function for their intended use, for period of five (5) years.
- b. Warranty covers attachment of internal acoustical barrier for period of five (5) years.
- c. Warranty covers partition chaining for period of five (5) years for new projects or period of five (5) years for installation of accordion folding partition chaining on existing projects. Warranty does not cover excessive abuse or misuse as determined by Owner and Manufacture.
- d. Warranty covers adjustment and operation of lead posts for period of five (5) years.
- e. Provide on-site warranty service within ten (10) days of receiving request and at no additional cost to Owner.

#### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category One VMR Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. Cornell Iron Works Inc, Mountaintop, PA www.cornelliron.com.
    - a. Acoustic Barrier Partition: TranZform Sound Model ESP20.

#### B. Performance:

- a. Acoustic Accordion Folding Partition:
  - Completed acoustic accordion folding partition assembly shall have NIC rating of thirty (30) in Chapel and Cultural Center and twenty four (24) in other areas when tested in accordance with ASTM E336 and calculated in accordance with ASTM E413 and when installed on header configuration and surrounding construction shown on Contract Documents.
- b. Color And Pattern Quality Standards:
  - 1) Partition to match approved pre-set color scheme selected for project:
    - a) Cornell: Driftwood.
  - 2) Safety Sweep Clip: Black.

#### C. Materials:

- 1. Acoustic Partitions:
  - a. Panel:
    - 1) 24 ga steel.
    - 2) Exposed surface: Vinyl-clad.
    - 3) Interior surface: Corrosion protected or coil steel coated.
    - Panel assembly shall have inner surface continuously covered with acoustical barrier permanently attached to panels.
  - b. Chaining: Required at partitions located between Cultural Center and any other adjacent room to Cultural
  - c. Handle: Cast aluminum with steel interior for fasteners.
  - d. Hanger Pins: Solid steel pins on all partitions.
  - e. Soffit Trim at track.
  - f. Stabilizer Bar: Provide stabilizer bar and horizontally adjustable lead posts for all partitions 12 feet (3.657 m) and higher.
  - g. Tie backs: Attached to secure partition in open position. Install straps to attach on one side of center of partition so as not to scratch partitions.
  - h. Trolley System.

#### D. Fabrication:

- 1. Fabricate accordion folding partitions according to actual field measurements of fully prepared, finished openings.
  - a. Owner-Furnished Product Manufacturer is responsible for field measurements and their accuracy.

# 2.2 ACCESSORIES

- A. Accordion Folding Partition Manufacturer's Track System:
  - 1. Provide approved Manufacturer's track system.
- B. Flexible Acoustic Barrier:

- Attach continuous flexible acoustic barrier to accordion folding partition header and accordion folding partition track system as recommended by Manufacturer, so no voids or openings exist and meet required NIC requirements.
- C. Locks: Do not install locks as per church guidelines.
- D. Safety Sweep Clip:
  - 1. Description:
    - a. Partition safety clip for accordion folding partition panels and lead post.
  - 2. Design Criteria:
    - a. As Approved by Owner.
    - b. Provide injection molded composite material with special rivet.
    - c. Provide complete coverage of bottom edge of each panel including hinge clips.
    - d. Provide cover for bottom edge of lead post.
    - e. Color: Black.
  - 3. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - a. Cornell: Part number 303610 to be attached with rivet part number 302322.

#### 2.3 SOURCE QUALITY CONTROL

- A. Tests:
  - 1. Sound Transmission Requirements:
    - Accordion-type folding products tested for laboratory sound transmission loss performance according to ASTM E90, determined by ASTM E413 and rated for an STC as follows:
      - 1) Sound transmission class (STC) shall be STC 45 minimum.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Evaluation And Assessment:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Openings:
      - Examine openings for adequacy in allowing successful accordion folding partition installation and operation.
      - 2) Verify openings are prepared to specified dimensions and plumb and level.
      - 3) Verify folding partition headers are level with required tolerances over entire length of opening.
      - 4) Verify conditions are in accordance with approved shop drawings.
    - b. Notify Architect in writing of inadequate conditions.
      - 1) Do not install accordion folding partitions until conditions have been corrected.
    - c. Commencement of Work by installer is considered acceptance of substrate.

## 3.2 PREPARATION

- A. Surface Preparation:
  - 1. Contractor's Responsibility:
    - a. Accordion Folding Partition Headers shall be leveled with finished floor to within +/- 1/4 inch (+/- 6 mm) tolerance over entire length of opening.
  - 2. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Field measurement of door openings.

## 3.3 INSTALLATION

- A. Special Techniques:
  - 1. Install accordion folding partitions in accordance with Manufacturer's printed instruction.
    - a. Install so track system is aligned, level, etc, to eliminate catching or binding of rollers.

 Install tie-backs at all accordion folding partitions. Adjust as necessary to keep accordion folding partition in stacked position.

## 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to following:
  - 1. Sound / Acoustic testing:
    - a. If accordion folding partitions do not meet specified NIC requirements or if accordion folding partitions are not ready for testing as result of accordion folding partition Manufacturer's non-performance, make necessary corrections and be responsible for additional fees and expenses required for subsequent testing by Architect's Sound / Acoustic Consultant.
  - Correct any work found defective or not complying with Contract Document requirements at no additional cost to Owner.

# 3.5 ADJUSTING

- A. Owner-Furnished Product Manufacturer's Responsibility:
  - Following completion of accordion folding partition installation, test and adjust accordion folding partitions for ease of operation.

## 3.6 CLEANING

- A. General:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Clean any soiling of accordion folding partitions as recommended by Manufacturer or any surrounding areas caused by installation of accordion folding partitions.
- B. Building Damage:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Installer responsible for repair of all damaged surfaces to their original condition from accordion folding partition installation.
- C. Waste Management:
  - 1. Contractor's Responsibility:
    - a. Provide Dumpster as required in Section 01 7400.
  - 2. Owner-Furnished Product Manufacturer's Responsibility:
    - a. All work areas are to be kept clean, clear and free of debris at all times.
    - b. Disposal of rubbish, debris, and packaging materials to Contractor provided Dumpster.

#### 3.7 PROTECTION

- A. General:
  - 1. Contractor's Responsibility:
    - a. Upon completion of accordion folding partition installation, protect accordion folding partitions from damage and replace or repair subsequent damage at no cost to Owner.

# SECTION 10 2813 COMMERCIAL TOILET ACCESSORIES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Included But Is Not Limited To:
  - 1. Selected accessories for Rest Rooms, Mother's Room, Font, and Dressing Areas:
    - a. Grab Bars.
    - b. Mirrors.
    - c. Sanitary Napkin Disposal Container.
    - d. Shelf.
    - e. Single Robe Hook.
  - 2. Custodial Room accessories:
    - a. Utility Shelf.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for blocking.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.
- C. Products Furnished by Owner and Installed by Contractor Under This Section:
  - 1. Selected accessories for Rest Rooms:
    - a. Automatic touchless towel dispensers.
    - b. Soap dispensers.
    - c. Toilet tissue dispensers.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. United States Access Board:
    - a. Americans with Disabilities Act (ADA):
      - 1) ADA Standards:
        - a) ADA Accessibility Guidelines (ADAAG) (2004 or latest version).
- B. Reference Standards:
  - 1. ASTM International:
    - a. A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - c. ASTM A666-15, 'Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar'.
    - d. ASTM C1036-16, 'Standard Specification for Flat Glass'.
    - e. ASTM F446-85(2009), 'Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area'.
  - 2. International Code Council / American National Standards Institute:
    - a. ICC/ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
  - 3. International Standard Organization:
    - a. ISO 25537:2008, 'Glass in Building Silvered Flat Glass Mirror.

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product data sheets indicating operating characteristics, materials and finishes.
    - b. Mounting requirements and rough-in dimensions.

- 2. Shop Drawings:
  - a. Schedule showing items used, location where installed, and proper attaching devices for substrate.
- B. Informational Submittals:
  - Manufacturers' Instructions:
    - a. Provide operation, care and cleaning instructions.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty for each product.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheets.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations:
  - 1. For products listed together in same Part 2 articles, obtain products from single source from single manufacturer.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - Manufacturer's standard warranty.
- B. Special Mirror Warranty:
  - Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage or frame corrosion defects within specified warranty period:
    - a. Warranty Period: fifteen (15) years from date of Substantial Completion.

## PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. AJW Architectural Products, A&J Washroom Accessories, Inc., New Windsor, NY www.ajwashroom.com.
    - b. American Specialties Inc (ASI), Yonkers, NY www.americanspecialties.com.
    - c. Bobrick Washroom Equipment Inc, North Hollywood, CA www.bobrick.com or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
    - d. Bradley Corp, Menomonee Falls, WI www.bradleycorp.com.
    - e. General Accessory Manufacturing Co (GAMCO), Durant, OK www.gamcousa.com.

#### B. Materials:

- 1. Design Criteria:
  - a. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
  - b. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
  - c. Fasteners:
    - 1) Exposed: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant.
    - 2) Concealed: Galvanized Steel.
- 2. Rest Rooms:
  - a. Mirrors:
    - 1) Channel-Frame Mirror:
      - a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
      - b) Roll-formed one piece construction.
      - c) Exposed surfaces have #4 satin finish.
      - d) Edges and corners are burr free.

- Glass: 1/4 inch silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
- Concealed surface mounted wall hanger.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) AJW Architectural Products: Model U711.
  - b) American Specialties (ASI): Model 0620.
  - c) Bobrick: Model B-165.
  - d) Bradley: Model 781.
  - e) General Accessory (GAMCO): Model C Series.
- b. Sanitary Napkin Disposal Container:
  - 1) Design Criteria:
    - a) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish. Seamless construction with radius and hemmed edges.
    - b) Stainless steel piano hinge.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model U590.
    - b) American Specialties (ASI): Model 0852.
    - c) Bobrick: Model B-270.
    - d) Bradley: Model 4781-15.
    - e) General Accessory (GAMCO): Model ND-1.
- c. Single Robe Hook:
  - 1) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish.
  - 2) Concealed mounting bracket.
  - 3) Stainless steel locking setscrew on bottom.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model UX110SF.
    - b) American Specialties (ASI): Model 7340-S.
    - c) Bobrick: Model B6717.
    - d) Bradley: Model 9114.
    - e) General Accessory (GAMCO): Model 76717.
- d. Grab Bars:
  - 1) Configuration shown on Contract Drawings. Include center support for longer lengths when required:
  - 2) Design Criteria:
    - Comply with ADA guidelines and ADAAG accessible design for structural strength and local and state codes.
    - b) Concealed mount.
    - c) 18 ga type 304 stainless steel tubing.
    - d) 1-1/2 inch diameter.
    - e) Provide center support when required.
    - f) Snap-on flange covers.
    - g) Peened (non-slip) finish.
    - h) Sustain loads in excess of 900 lbs.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model UG3 Series.
    - b) American Specialties (ASI): Model 3800 Series.
    - c) Bobrick: Model B-6806 Series.
    - d) Bradley: Model 812 Series.
    - e) General Accessory (GAMCO): Model 150 Series.
- e. Shelf:
  - a) Design Criteria:
  - b) 18 ga, stainless steel with No. 4 Satin finish.
  - c) 6 inches wide.
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model U776.
    - b) American Specialties (ASI): Model 0692.
    - c) Bobrick: Model B-296.
    - d) Bradley: Model 756.
    - e) General Accessory (GAMCO): Model S-6.
- 3. Custodial Rooms:
  - a. Utility Shelf:
    - 1) Provide mop / broom hangers, shelf, and rod for hanging rags.
    - 2) Size as shown on Contract Drawings.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) AJW Architectural Products: Model UJ41.
- b) American Specialties (ASI): Model 1300 Series.
- c) Bobrick: Model B-224 Series.
- d) Bradley: Model 9933 Series.
- e) General Accessory (GAMCO): Model US Series.

#### 4. Mother's Rooms:

- a. Mirror:
  - a) Size:
  - b) 24 inch by 60 inch mirror.
  - 2) Channel-Frame Mirror:
    - a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
    - b) Roll-formed one piece construction.
    - c) Exposed surfaces have #4 satin finish.
    - d) Edges and corners are burr free.
    - e) Glass: 1/4 inch silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
    - f) Concealed surface mounted wall hanger.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model U711.
    - b) American Specialties (ASI): Model 0620.
    - c) Bobrick: Model B-165.
    - d) Bradley: Model 781.
    - e) General Accessory (GAMCO): Model C Series.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Comply with ADA Accessibility Guidelines and installation heights as shown on Contract Drawings.
- B. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.
- C. Install using mounting devices proper for base structure.
- D. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.
- E. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- F. Grab Bars:
  - 1. Install as per Manufacturers written installation instructions.
  - 2. Install grab bars to withstand downward force of not less than 250 lbf per ASTM F446.

# 3.2 REPAIR

- A. Repair or replace defective work, including damaged equipment and components.
- B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

## 3.3 CLEANING

A. Clean unit surfaces and leave in ready-to-use condition.

## 3.4 ADJUSTING

A. Test each piece of equipment provided with moving parts to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.

# 3.5 CLOSEOUT ACTIVITIES

A. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.

# SECTION 10 2814 BABY-CHANGING STATION

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes But Is Not Limited To:
  - 1. Coordination and sequencing of Owner-Furnished baby-changing station as described in Contract Documents.
- B. Products Installed But Not Supplied Under This Section:
  - 1. Baby-changing station.
- C. Related Sections:
  - 1. Section 01 6400: 'Owner-Furnished Products', Owner will furnish baby-changing station. PART 2 PRODUCTS of this Section establish quality of materials for information of Contractor, Architect, and Owner's representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking in wood stud framed walls for baby-changing stations.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American National Standards Institute:
    - a. ANSI Z535.4-2011. 'Product Safety Signs and Labels'.
  - 2. ASTM International:
    - ASTM G21-15, 'Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi'.
    - b. ASTM F2285-04(2016), 'Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use'.
  - B. International Code Council / American National Standards Institute:
    - a. ICC/ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the efforts of various trades affected by Work of this Section.
  - 2. Coordinate completions of solid blocking in walls.
- B. Sequencing:
  - 1. Install baby-changing stations after following has been completed:
    - a. Adjacent walls and ceilings are finished and painted.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide product literature or cut sheet on baby-changing station.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Manufacturer to provide \$10,000,000 minimum 'Certificate of Liability Insurance' policy.
      - Policy on file at Church Headquarters. For questions, notify Mark Douglass at markdouglass@ldschurch.org.
  - Manufacturer Instructions:
    - a. Printed installation instructions.

- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include copy of final, executed warranty for defects in material and workmanship.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut sheets.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - Manufacturer's standard warranty for baby-changing station to be free from defects in material and workmanship under normal use and service, with proper maintenance, for five (5) years.

#### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definition of Categories.
  - 1. Koala, Denver, CO www.koalabear.com.
- B. Baby Changing Station:
  - 1. Description:
    - a. Molded high impact polyethylene with integral straps for securing baby.
  - 2. Design Criteria:
    - a. Manufacture to provide 'Certificate of Liability Insurance' policy.
    - b. Antimicrobial bed surface
    - c. Support 200 lbs with minimal deflection.
    - d. Meet ADA regulations of ICC/ANSI A117.1 when properly installed.
    - e. Conform to ANSI Z535.4 for safety signs and labels, ASTM G21 for antifungal standards, and ASTM F2285 for consumer safety performance standard.
  - 3. Approved Products. See Section 01 6200 for definition of Categories:
    - a. Horizontal: Koala Kare model number KB200 by Koala.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify that solid blocking has been installed in wall framing where changing station is to be installed.
  - 2. Do not install unit by any other means other than screws or lag bolts into solid blocking.

## 3.2 INSTALLATION

A. Install items in accordance with Manufacturer's submitted, written instructions for screws or lag bolts into solid substrate capable of supporting 200 lbs. Install using mounting devices proper for base structure.

## SECTION 10 4400 FIRE PROTECTION SPECIALTIES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under This Section:
  - 1. Wall hung extinguishers and brackets.
  - 2. Extinguishers with cabinets.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for blocking in wood-framed walls.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

#### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheets for cabinets and extinguishers.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include copy of final, executed warranty.
    - b. Record Documentation:
      - 1) Testing and Inspection Reports:
        - Testing Agency Inspecting Reports of Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

## 1.4 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard, written warranty on fire extinguisher.

## PART 2 - PRODUCTS

#### 2.1 EQUIPMENT

- A. Manufacturers:
  - 1. Fire Extinguishers:
    - a. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
      - 1) Amerex Corp, Trussville, AL www.amerex-fire.com.
      - 2) Ansul Incorporated, Marinette, WI www.ansul.com.
      - 3) Buckeye Fire Equipment, Kings Mountain, NC www.buckeyef.com.
      - 4) Extinguishers private-labeled by manufacturers approved above are approved, with appropriate documentation.

- 2. Cabinets And Brackets:
  - a. Type One Acceptable Manufacturers:
    - 1) J L Industries, Bloomington, MN www.jlindustries.com.
    - 2) Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
    - 3) Modern Metal Products / Technico, Owatonna, MN www.modern-metal.com.
    - 4) National Fire Equipment Ltd, Scarborough, ON www.nationalfire.com.
    - 5) Potter-Roemer, Cerritos, CA www.potterroemer.com.
    - 6) Samson Products Inc, City of Commerce, CA www.samsonproducts.com.
    - 7) Seton Inc, Richmond Hill, ON (905) 764-1122.
    - 8) Equal as approved by Architect before bidding. See Section 01 6200.
- B. Type One Acceptable Distributors:
  - 1. W.W. Grainger, Inc., Lake Forest, IL www.grainger.com.
  - 2. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Fire Extinguishers:
  - Design Criteria:
    - a. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge and which does not need recharging except after use.
    - b. Instructions for repairs, maintenance, and recharging shall be attached.
    - c. Unit shall be tested and approved by UL and have minimum 4A:60-B:C UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.
- D. Fire Extinguisher Cabinets:
  - 1. Design Criteria:
    - a. Two-piece, semi-recessed or flush type depending on wall thickness, and have white baked enameled steel tubs with white baked enamel return trim and doors, clear acrylic glazing, 'Safe-T-Lock,' and cylinder locks.
    - b. Supply each cabinet with one specified fire extinguisher.
  - 2. Type One Acceptable Manufacturers:
    - a. Basis of Design Product: Ambassador 1017 G10 by J L Industries.
    - Equal as approved by Architect before bidding from Acceptable Manufacturer's equivalent product. See Section 01 6200.
- E. Wall-Mounted Brackets:
  - 1. Design Criteria:
    - a. Heavy duty with minimum of double strap/bracket.
  - 2. Category Four Approved Bracket. See Section 01 6200 for definitions of Categories:
    - a. Basis of Design Product: No. 846 by Larsen's.
    - b. Equal as approved by Architect before bidding from Approved Manufacturer's equivalent product.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Special Techniques:
  - 1. Securely mount cabinets and hangers plumb with wall surfaces.
  - 2. Trim for cabinets shall be neat in appearance.

## **SECTION 10 5713** HAT AND COAT RACKS

#### PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Products Furnished But Not Installed Under This Section:
  - 1. Wall-mounted Coat Racks and Hangers as described in Contract Documents.
- Related Requirements:

  - Section 06 1100: 'Wood Framing' for wall blocking.
    Section 06 2001: 'Common Finish Carpentry Requirements' for:
    - a. Installation of Coat Racks.
    - Furnishing and installation of Hook Strips and Hooks.

#### 1.2 **SUBMITTALS**

- Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - Record Documentation:
      - Manufacturers documentation:
        - Manufacturer's literature.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- Manufacturers:
  - Manufacturer Contact List:
    - EMCO Specialty Products Inc, Kansas City, KS www.emcospi.com.
    - Magnuson Group, Burr Ridge, IL www.magnusongroup.com.
- В. Materials:
  - Coat Racks:
    - Furnish one hanger for each 2-1/2 inches of rack.
    - Design Criteria:
      - 1) Wall mounted.
      - 2) Brackets: powder-coated metal.
      - 3) Shelf Slats or Tubes: aluminum.
      - 4) Hanger Bar: 1 inch metal.
      - Finish as selected by Architect. 5)
    - Type Two Acceptable Products:
      - Coat Hall Alcoves: 1)
        - a) EMCO System R1.
        - Magnuson DS-3HA Series.
      - **Baptistry Closet:** 2)
        - EMCO System R2.
        - Magnuson DS-3HA Series.
      - Hangers / Receptacles: 3)
        - EMCO No. 17 ball top hangers and model C receptacles.
        - Magnuson MIRAC MG-17PH molded polystyrene hanger.
      - Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION: Not Used

## **SECTION 10 7430** ALUMINUM STEEPLE

#### PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Includes But Not Limited To:
  - 1. Furnish and install steeple as described in Contract Documents, including application of sealants.
- Related Requirements:
  - Section 05 0503: 'Shop-Applied Metal Coatings' for quality of metal primer.
  - Section 05 0523: 'Metal Fastening' for quality of anchor rods.

  - Section 05 1223: 'Structural Steel for Building' for quality of metal support angles. Section 07 3113: "Asphalt Shingles' for installation of Secondary Underlayment under Steeple.
  - Section 07 7201: 'Roofing Accessories: Steeple' for square tube pipe boot at steeple base.' 5.
  - Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants. 6.
  - Section 26 4100: 'Facility Lightning Protection' for lightning protection system from steeple to ground level.

#### 1.2 REFERENCES

- Association Publications: Α.
  - American Architectural Manufacturers Association (AAMA):
    - AAMA 2605-13, 'Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels'.
- Reference Standards:
  - American Society of Civil Engineers (ASCE):
    - ASCE 7, 'Minimum Design Loads for Buildings and Other Structures'.
  - **ASTM** International:
    - ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
  - International Building Code (IBC latest approved edition):
    - Chapter 15, 'Roof Assemblies And Rooftop Structures':
      - 1) Section 1509, 'Rooftop Structures':
        - 1509.5, 'Towers, Spires, Domes, and Cupolas'.
    - Chapter 16, 'Structural Design':
      - 1) Section 1609 'Wind Loads'.
      - 2) Section 1613 'Earthquake Loads'.

#### 1.3 **QUALITY REQUIREMENTS**

- Sequencing:
  - Steeple Support Enclosure to be completed before Steeple is installed.
- - Provide eight (8) weeks minimum from approval of Shop Drawings to beginning of installation of Steeple.

#### 1.4 **SUBMITTALS**

- Action Submittals:
  - **Shop Drawings:** 
    - Shop drawings and calculations stamped and signed by Engineer in accordance with local building code requirements.

- b. Show design load parameters, dimensions, adjacent construction, materials, thicknesses, core material thicknesses, fabrication details, required clearances, field jointing, tolerances, colors, finishes, method of support, integration of components, and attachment connections.
- c. As required for proper handling and erection.

#### B. Informational Submittals:

- 1. Manufacturer Instructions:
  - a. Steeple Fabricator's erection instructions and drawings.
  - b. Steeple Fabricator's maintenance instructions.

#### C. Closeout Submittals:

- Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Maintenance instructions.
  - b. Warranty Documentation:
    - 1) Include final, executed copy of warranty.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Engineer registered in state in which Project is located.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to the following:
  - 1. Steeple Fabricator specializing in aluminum steeple fabrication with ten (10) years experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Protect components during shipment by means of crates or padding so they arrive at project undamaged.
  - Unload and inspect components for imperfections or for damage incurred during shipping and transit procedures.
  - 3. Replace damaged components at no additional cost to Owner.
- B. Storage And Handling Requirements:
  - 1. Maintain protection during storage on site before installation.

#### 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide Steeple Fabricator's written warranty for material, workmanship, and installation.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Fabricators:
  - 1. Category Four Approved Fabricators. See Section 01 6200 for definitions of Categories:
    - Campbellsville Industries Inc, Campbellsville, KY, (800) 467-8135, Fax: (502) 465-6839 www.cvilleindustries.com.
    - b. Munns Manufacturing, Tremonton, UT, phone (888) 774-7348, (435) 257-5673, Fax: (435) 257-3842 www.munnsmfg.com.

ALUMINUM STEEPLE - 2 - 10 7430

#### B. Performance:

- 1. Design Criteria:
  - a. Design and construct steeple to withstand a wind speed of 100 mph as defined by Section 1609 'Wind Loads' of the International Building Code unless local codes require greater forces or per seismic requirements whichever are greater.
  - b. Design and construct steeple for a Seismic Design Category D per Section 1613 'Earthquake Loads' of the International Building Code unless local codes require greater forces or per wind requirements whichever are greater.

#### C. Materials:

- Base: Structural steel angles engineered and sized for steeple size and meeting requirements of ASTM A36.
- Steeple:
  - Framing: Aluminum extrusions alloy 6061-T6.
  - b. Exterior Covering:
    - 1) Aluminum Cladding: 0.032 inch thick minimum, alloy 3003-H14 minimum.
  - c. Lightning Protection:
    - 1) Provide clamp on structural member at bottom of tower or pigtail for connection of lightning protection cable provided under Section 26 4100.
    - 2) UL approved for intended use.
    - 3) Isolate dissimilar materials or provide components of compatible materials.

#### D. Fabrication:

- 1. Do not use wood or wood products in fabrication of steeple.
- 2. Base:
  - a. Paint steel elements with two (2) heavy coats of metal primer.
  - b. Isolate aluminum framing in contact with steel with material compatible with both aluminum and steel to prevent electrolysis.
  - Secure structural aluminum framing to steel base with appropriate size stainless steel bolts, with lock nuts and washers.

#### 3. Steeple:

- a. Framing: Fasten aluminum framing together with cold driven rivets, alloy 6061-T6, not loaded in tension and with one inch (25 mm) minimum spacing.
- b. Exterior Covering: Use lock seams and conceal exterior fasteners as much as possible.
- c. Cornices:
  - 1) Form true to dimensions with vertical joints kept to a minimum.
  - 2) Reinforced interior cornice profiles to resist wind loading during transit.
- d. Finial: Formed aluminum of specified size and tapered to point, with spun aluminum ball.

#### E. Finish:

- 1. Fluorocarbon Carbon:
  - a. Comply with AAMA 2605.
  - b. Polyvinyledene Fluoride (PVDF) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum (PVDF) in resin portion of formula and providing pencil hardness of 3H.
    - Thermo-cured two-(2) coat system consisting of corrosion inhibiting epoxy primer and topcoat factoryapplied over properly pre-treated metal:
  - c. Dip spun or fabricated shapes in caustic etch, coat with primer or epoxy and finish with exterior vinyl finish.
  - d. Finish shall be of such quality that shearing or forming encountered during fabrication will not separate finish from aluminum.
  - e. Color:
    - 1) Steeple: White.
    - 2) Steeple windows: Matte Black.
  - f. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) BASF.
    - 2) PPG Industries, Inc.
    - 3) Valspar Corporation.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Verify substrates and structural framing are ready to receive work and dimensions are as shown on shop drawings.
  - 2. Verify site conditions are suitable and accessible for delivery and installation.
  - 3. Before steeple placement, have support framing inspected by licensed structural engineer acceptable to Owner to insure supporting elements are properly installed. Report problems with installation of supporting elements to Owner in writing before installing steeple.

## 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using Steeple Fabricator's recommendations for substrate.

#### 3.3 INSTALLATION

- A. Special Techniques:
  - 1. Install in accordance with Steeple Fabricator's handling and erection directions.
  - 2. Clean all soiled and dirty areas and touch up any scratches or abrasions to finish before lifting into position.
  - 3. Secure steel base to roof framing as described in Contract Documents.
  - 4. Isolate dissimilar metals.
  - 5. Bolted connections with Steeple Fabricator's sealant and apply to clean and dry surfaces.
  - 6. Seal joints between steeple and other substrates with sealants recommended by Steeple Fabricator.
- B. Interface With Other Work:
  - 1. Coordinate with other trades as required to assure proper and adequate installation.
  - 2. Install after square tube pipe boot as specified in Section 07 7201: 'Roofing Accessories: Steeple', roofing membrane included for project, and after inspection to confirm that roofing membrane is weather tight.

## 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Remove installed steeple that has wrinkled or oil canning appearance, repair or replace and reinstall at no additional cost to Owner.

#### 3.5 CLEANING

A. Installer to clean fabrications of foreign material using cleaning methods recommended in writing by Steeple Fabricator.

## 3.6 PROTECTION

- A. General Contractor Responsibility:
  - 1. Protect steeple after installation, as recommended by Steeple Fabricator, until completion of Project.

## END OF SECTION

ALUMINUM STEEPLE - 4 - 10 7430



# NIBLEY 12 & MENDON UTAH STAKE CENTER

## **DIVISION 11 - EQUIPMENT:**

DIVISION 11 - EQUIPMENT:			
11 3000 Residential Equipment			
11 3114	Serving Area Residential Appliances		
11 5000	Educational and Scientific Equipment		
11 5213	Projection Screens		
11 6000	Entertainment Equipment		
11 6144	Platform Curtains		
11 6500	Athletic and Recreational Equipment		
11 6624	Basketball Equipment		
11 6625	Volleyball Equipment		
11 6626	Wall Padding		
11 6643	Scoreboards		
11 9000	Other Equipment		
11 9116	Baptismal Font Mirror		
11 9119	Baptismal Font Railing		

DIVISION 11 EQUIPMENT

# SECTION 11 3114 RESIDENTIAL SERVING AREA APPLIANCES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Free Standing Range.
  - 2. Refrigerator.
  - 3. Microwave Oven.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish specified appliances. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives. General Contractor to install all Owner Furnished Products.
  - 2. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets' for appliance included in cabinet.
  - 3. Division 26: 'Electrical' for outlets and electrical service.

#### 1.2 SUBMITTALS

- A. Informational Submittals:
  - Manufacturer's Instructions:
    - a. Provide Anti-Tip Bracket installation instructions for free standing range.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature packaged for each appliance.

## 1.3 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

- A. Delivery And Acceptance Requirements:
  - 1. General Contractor responsibility:
    - a. Supervise unloading and handling for Owner Furnished Products.
    - b. Range
      - 1) Verify Anti-Tip Brackets are included. Contact Owner for missing brackets.
- B. Storage And Handling Requirements:
  - 1. General Contractor responsibility:
    - a. Provide secure location protected from weather and other trades.

#### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. Approved Manufacturers:
    - a. Free Standing Range:
      - 1) General Electric.
  - 2. Refrigerator / Freezer:
    - a. Approved Manufacturer:
      - General Electric.

- 3. Microwave Oven:
  - a. Approved Manufacturer:
    - 1) Amana.
    - 2) General Electric.
    - 3) Panasonic.
    - 4) Samsung.

#### B. Manufactured Units:

- 1. Free Standing Range:
  - a. 30 inch free-standing conventional electric range with two 8 inch and two 6 inch calrod surface heating units.
  - b. Color: White.
- 2. Refrigerator / Freezer:
  - a. 16 cu ft frost free model with top freezer compartment and reversible doors.
  - b. Color: White.
- 3. Microwave Oven:
  - a. 800 watts.
  - b. Dimensions: 12 inches high by 24 inches wide by 13 inches deep.
  - c. Color: White.

#### 2.2 ACCESSORIES

- A. Free Standing Range:
  - 1. Anti-Tip Bracket.

PART 3 - Range Cord with 4 prong plug.

#### 3.1 EXECUTION

#### 3.2 INSTALLATION

- A. General Contractor shall install all Owner Furnished Products as identified in this specification section:
  - 1. Free Standing Range:
    - a. Anti-Tip Bracket provided by Owner Furnished Manufacturer:
      - 1) Range must be secured by properly installed Anti-Tip Bracket.
      - Install bracket using Manufacturer's printed installation instructions (screws provided for wall mounting only).
      - 3) Verify bracket is installed correctly and engaged properly:
        - a) After installation of bracket, slide range into final location.
        - b) Verify rear leveling leg must be fully inserted into bracket.
        - c) Carefully tip range forward. DO NOT tip range more than 4 inches.
        - d) If bracket does not stop range within 4 inches, bracket is NOT properly installed and MUST be reinstalled and retested.

## SECTION 11 5213 PROJECTION SCREENS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - Coordination, sequencing, and adjusting of Owner-Furnished projection screens and brackets as described in the Contract Documents.

## B. Related Requirements:

- Section 01 6400: 'Owner-Furnished Products', Owner will furnish projection screens and brackets. PART 2
  PRODUCTS of this Section establishes quality of materials for information of Contractor, Architect, and Owner's
  representatives.
- 2. Section 06 1100: 'Wood Framing' for blocking in wood stud framed walls for projection screens brackets.
- 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of Owner-Furnished projection screens and brackets.
- 4. Division 26: Electrical connections and setting of limit switches for Motorized Project Screen(s).

#### 1.2 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- 1. Coordinate the efforts of the various trades affected by the Work of this Section.
- 2. Coordinate completions of solid blocking in framed walls.

#### B. Sequencing:

- 1. Install projections screens after following has been completed:
  - a. Solid blocking installed in framed walls for projection screen brackets.
  - b. Adjacent walls and ceilings are finished and painted.
  - c. Motorized Projection Screen:
    - 1) Electrical connections and setting of limit switches has been completed.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Written installation instructions.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Manufacturer's operating instructions.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut-sheet.

#### 1.4 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard warranty against defects in material and workmanship.

#### PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Manufacturer:
  - 1. Category Two National Contract Manufacturers. See Section 01 6200 for definition of Categories:
    - a. Draper Inc, Spiceland, IN www.draperinc.com.
- B. Materials:
  - 1. Wall-Mounted or Ceiling-Mounted Motorized Projection Screen:
    - a. Exposed, wall-mounted, electrically operated screen unit.
    - Heavy-duty 2.5 amp ball bearing unit with 'stop in any position' and up and down factory pre-set limit switches
    - c. Chapel:
      - 1) One (1) 192 inches high by 192 inches wide:
        - a) Flame retardant screen.
        - b) Matte white.
        - c) 7 foot drop and reverse roll.
        - d) Screen operates instantly at touch of button and stops automatically in 'up' and 'down' positions.
      - 2) Category Two Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Targa Electric Project Screen by Draper.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify solid blocking has been installed in framed walls for projection screen brackets.
  - 2. Verify adjacent walls and ceilings are finished and painted.
  - 3. Verify electrical work is complete for motorized projection screen(s).
  - 4. Notify Architect in writing of inadequate conditions.

#### 3.2 INSTALLATION

- A. Interface With Other Work:
  - Coordinate with Section 06 1100: 'Wood Framing' for blocking location in wood stud framed walls for projection screen brackets.
- B. Follow Manufacturer's written installation instructions at locations as indicated on Contract Documents.

#### 3.3 ADJUSTING

- A. Ceiling-Mounted Motorized Projection Screen:
  - 1. Set limit switches so bottom of screen stops as follows:
    - a. Rostrum: 3 feet above finish floor of Rostrum.

## SECTION 11 6144 PLATFORM CURTAINS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install Platform Curtains as described in Contract Documents including:
    - a. Proscenium Drapes.
    - b. Proscenium Drape Track.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Inherently Flame Resistant: Material that meets requirements set forth in NFPA 701. Inherently flame resistant fabric is woven from fibers that are non-combustible for life of material.
  - 2. Proscenium Drape: Curtain between audience and stage or platform.
  - 3. Proscenium Drape Track: Formed or extruded shape that contains moving carriers and supports drapery. Often have a cord to open and close the drapes.
- B. Reference Standards:
  - National Fire Protection Association:
    - a. NFPA 701, 'Methods of Fire Tests for Flame Propagation of Textiles and Films' (2015 Edition).

#### 1.3 SUBMITTALS

- A. Action Submittals
  - 1. Product Data:
    - a. Color and style selections.
- B. Informational Submittals:
  - Certificates:
    - a. Manufacturer's Certificates of flame-proofing.
  - 2. Qualification Statement:
    - a. Fabricator / Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's and Fabric Supplier's literature or cut sheets for each element of system.
        - b) Typewritten copy of operating instructions.
        - c) Color and style selections.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Material used shall be inherently flame retardant with a flame spread rating meeting code requirements when tested in accordance with NFPA 701:
    - a. Attach permanent tag to each panel attesting to flame retardant quality of material used.
- B. Qualifications:
  - 1. Fabricator / Installer: Requirements of Section 01 4301 applies, but not limited to following:

- a. Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
- b. Upon request, submit documentation.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

- A. Manufacturers / Suppliers:
  - 1. Contact Information:
    - a. Automatic Devices Co (ADC), Allentown, PA www.automaticdevices.com
    - b. H & H Specialties Inc, South El Monte, CA www.hhspecialties.com.
    - c. JB Martin, Leesville, SC www.jbmartin.com.
    - d. KM Fabrics Inc, Greenville, SC (800) 845-1896 or (803) 295-2550.

#### B. Materials:

- 1. Proscenium Drape Track Assembly:
  - a. Design Criteria:
    - 14-ga galvanized with large neoprene roller carriers with double row of ball bearings, rubber bumpers, and hand-line supports.
    - 2) Accessories:
      - a) Rearfold attachments.
      - b) 6 inch trim chains.
      - c) 3/8 inch hand-line and adjustable floor pulley.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Besteel Model 172 by ADC.
    - 2) Atlas Silk 200 Series by H & H Specialties.
- 2. Proscenium Suspension Material:
  - a. Use bright steel jack chain as follows:
    - 1) Trim chain for drapes shall be No. 10 chain.
    - 2) Suspend tracks and equipment by No. 6 chain.
- 3. Curtains:
  - a. General:
    - 1) Fabrics shall be inherently flame resistant or flame-proofed in compliance with New York Flame-Proofing Code or with local codes, whichever is most restrictive.
    - 2) Use no less than 1/2 widths of material in fabricating curtains.
  - b. Proscenium Drape:
    - 1) Provide fullness equal to more than 1-1/2 times opening width.
    - Box pleated at top to 4 inch heavy-duty jute webbing.
    - 3) Arrange curtain so center of each pleat is provided with brass grommet and S-hook. Pleats and grommets to be 12 inches on center.
    - 4) Side Hems:
      - a) Center overlap edges shall be double faced 27 inches, both sides.
      - b) Off-platform edges shall lap 2-1/2 inch.
    - 5) Bottom Hems:
      - a) 6 inch lap.
      - Provide on drapes, 4 inches, 8 ounce weights, sewn in separate reinforced pockets at corners and vertical hems.
    - 6) Proscenium curtain shall be of width to provide 24 inches minimum on center overlap and at least 24 inches offstage extension on each end.
    - 7) Category Four Approved Patterns. See Section 01 6200 for definitions of Categories:
      - a) JB Martin: 8495 Opera.
      - b) KM Fabrics: Prestige.
    - 8) Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
      - a) Emerald Schemes:
        - (1) JB Martin: 7005 Emerald.
        - (2) KM Fabrics: 1041 Hunter.
    - 9) Category Four Approved Fabrics. See Section 01 6200 for definitions of Categories:
      - a) 8495 Opera by JB Martin.
      - b) Prestige by KM Fabrics.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Set equipment so Platform is properly masked.

END OF SECTION

PLATFORM CURTAINS - 3 - 11 6144

# SECTION 11 6624 BASKETBALL EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Included But Is Not Limited To:
  - 1. Coordination, sequencing, and scheduling of Owner-Furnished basketball equipment installation as described in the contract documents including:
    - a. Installation of Owner-Furnished basketball hanger brackets with bolts, nuts, and washers.

## B. Related Requirements:

- 1. Section 01 1200: Owner will furnish and install pre-finished Basketball Standards. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
- 2. Section 01 7400: 'Cleaning and Waste Management' for providing dumpster for Owner Furnished waste debris.
- 3. Section 06 1100: 'Wood Framing' for installation of basketball hanger brackets with bolts, nuts, and washers.

#### 1.2 REFERENCES

- A. Abbreviations and Acronyms:
  - 1. FIBA: International Basketball Federation (Fédération Internationale de Basketball).
  - 2. NCAA: National Collegiate Athletic Association.
  - 3. NFHS (NFSHA): National Federation of State High School Associations.
  - 4. Powder Coating Coatings that are protective, decorative, or both, formed by application of coating powder electrostatically to substrate and fused into continuous films by application of heat or radiant energy.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D3451-06(2017), 'Standard Guide for Testing Coating Powders and Powder Coatings'.
    - b. ASTM D7378-16, 'Standard Practice for Measurement of Thickness of Applied Coating Powders to Predict Cured Thickness'.
    - c. ASTM D7803-12, 'Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
  - 2. Coordinate completion of basketball hanger brackets with bolts, nuts, and washers.
    - a. Assure accurate installation of basketball hanger brackets using Owner-Furnished template.
- B. Sequencing:
  - 1. Install basketball standards after the following as been completed:
    - a. Basketball hanger brackets have been installed.
    - b. Adjacent walls and ceilings are finished.
- C. Scheduling:
  - Notify Owner-Furnished Product Manufacturer two (2) weeks maximum after installation of basketball hanger brackets.
    - a. Submit template with bracket field dimensions with notification.

#### 1.4 SUBMITTALS

A. Action Submittals:

- 1. Basketball Hanger Brackets:
  - a. Basketball hanger brackets with bolts, nuts, and washers to be installed by Section 06 1100.
- B. Informational Submittals:
  - Manufacturer Instructions:
    - a. Manufacturer's installation instructions and template for location of basketball hanger brackets.
    - b. Wiring diagrams.
    - Field Quality Control Submittals:
      - a. Field dimension of brackets as indicated on Manufactures template after installation by Section 06 1100.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Operating and maintenance instruction.
      - 2) Parts list.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.
        - b) Color and style selection.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 applies, but not limited to the following:
  - 1. The Owner-Furnished Product Manufacturer shall approve installer.
    - a. Installer shall be experienced in installing basketball backstops.
- B. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Touch-up paint.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements: Requirements of Section 01 6600 applies, but not limited to the following:
  - 1. General:
  - a. Delivery of basketball standard is preferred to coincide with installation.
  - 2. Contractor's Responsibility:
    - a. Coordinate delivery with Owner-Furnished Product Manufacturer.
    - b. Supervise unloading and handling. When necessary, provide assistance off-loading product with transportation carrier.
    - c. Verify items received. Note any discrepancies on Delivery Receipt before driver leaves.
    - d. Examine for visible evidence of damage such as holes, tears, or crushed portions of cartons and finish being scratched, gouged and/or damaged. Note findings on Delivery Receipt before driver leaves.
    - e. Do not refuse any delivery because of damage.
      - 1) Note damage on Delivery Receipt and accept shipment.
      - 2) Notify Project Manager and Purchasing Coordinator to report findings within one (1) business day.
  - B. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Delivery:
      - 1) Deliver in Manufacturer's original, unopened package(s) to project site.
      - 2) Delivery shall be no more than ten (10) days before start of installation of basketball standards.
- B. Storage And Handling Requirements:
  - 1. Contractor's Responsibility:
    - a. Provide secure location protected from the weather and other trades.
    - b. Do not remove packaging material.
    - c. Replace materials damaged due to job site neglect and damage at no cost to Owner.

#### 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's written guarantee of all labor, equipment and materials for a period of all five (5) years from the date of substantial completion of the building.
- B. Special Warranty:
  - 1. Limited Lifetime Warranty on glass backboard.
    - a. Warranty shall cover glass backboard against breaking during play of basketball only.
    - b. Warranty does not cover costs required in event of user abuse or neglect.
    - c. If backboard breaks under Warranty, then replacement part will be furnished at no charge to the Owner.

#### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Manufacturer:
  - Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. ADP Lemco Inc., Draper, UT, phone (800) 575-3626, www.adplemco.com.

#### B. Performance:

- 1. Design Criteria:
  - a. Backboard meets all NCAA and NFSHA specifications.
  - b. 'Bolt On' edge padding meets all NCAA, NFHS, and FIBA specifications.
  - c. Complete installation shall meet official basketball rules of NCAA.

#### C. Materials:

- 1. Ceiling Mounted, Stationary, Ceiling Braced Design:
  - a. Single Pole, Ceiling Mounted, Stationary, Ceiling Braced Basketball Unit:
    - 1) Front drop pipe assembly fabricated from 6-5/8 inch O.D. Pipe and supported with 2 inch square tubing with gussets suspended from bottom chord of roof trussed rafters. Fully weld frame.
    - 2) Diagonal bracing pipe:
      - a) Bracing pipe to be one (1) 2-3/8 inch O.D. pipes supporting front drop pipe assembly.
      - b) Bracing pipe to be attached to front drop pipe assembly and extend diagonally to rear horizontally support member suspended from bottom chord of trussed rafters.
    - 3) Superstructure:
      - a) Backboard assembly to be suspended from 2-3/8 inch O.D. superstructure pipe.
      - b) Attach superstructure pipe to building structure to distribute weight across supporting members.
    - 4) Board extensions
      - Backboard to be installed with board extensions meeting NCAA and NFSHSA rules designating
         6 inch minimum distance between backboard and frame.
    - 5) Finish:
      - a) Powder coated after complete fabrication:
        - (1) Meet ASTM D3451 for procedures for powder powders and coatings.
        - (2) Meet ASTM D7378 for thickness measurement of dry coating powders.
        - (3) Meet ASTM D7803 for surface preparation prior to powder coating.
        - (4) Steel must be free of any scale, paint, varnish, grease, or rust.
        - (5) Chemical wash and rinse.
        - (6) Apply corrosion-inhibiting iron phosphate treatment.
      - b) Apply powder coating.
      - c) Color: Pre-selected by Owner.
    - 6) Quality Standard:
      - a) Series 1500 by ADP Lemco.
  - b. Backboard:
    - 1) Rectangular glass backboard.
    - 2) 40 by 54 inch rectangular.
    - 3) 1/2 inch minimum tempered glass with target and border fired into glass.
    - 4) Steel inner frame with (4) four bushings protruding through cutout holes in glass and support rim totally independent from glass backboard.
    - 5) Outer frame is heavy-duty aluminum.

- 6) Quality Standard: Model 63-SW Glass Backboard by Lemco.
- c. Cushion edge pad.
  - 1) Meet all specifications set by the NCAA, NFHS and FIBA.
  - 2) Color: Grey.
  - 3) Quality standard:
    - a) Model 105 'Bolt On' by ADP Lemco.
- d. Basketball Goal:
  - 1) Standard front mount rim, and Nylon net. Rim shall bear on frame, not on backboard. Mounting bolts shall not protrude on the face side of backboard.
  - 2) Meets all NCAA and NFHS specifications.
  - 3) Finish:
    - a) Goals shall be finished in bright orange enamel paint in accordance with official rules.
  - 4) Quality standard:
    - a) Model 20 by ADP Lemco.

#### 2.2 ASSESSORIES

- A. Owner-Furnished Product Manufacturer's Responsibility:
  - 1. Provide basketball hanger brackets with bolts, nuts, and washers.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Special Techniques:
  - Owner-Furnished Product Manufacturer's Responsibility:
    - a. Installation shall adhere to manufacturers printed instructions and accepted template.
    - b. Apply Touch-up paint as required after installation or standard is completed.

#### 3.2 CLEANING

- A. Building Damage:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Installer responsible for repair of all damaged surfaces to their original condition from basketball installation.
- B. Waste Management:
  - 1. Contractor's Responsibility:
    - a. Provide Dumpster as required in Section 01 7400.
  - 2. Owner-Furnished Product Manufacturer's Responsibility:
    - a. All work areas are to be kept clean, clear and free of debris at all times.
    - b. Disposal of rubbish, debris, and packaging materials to Contractor provided Dumpster.

#### 3.3 PROTECTION

- A. General:
  - 1. Contractor's Responsibility:
    - Upon completion of basketball installation, protect from damage and replace or repair subsequent damage at no cost to Owner.

# SECTION 11 6625 VOLLEYBALL EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - 1. Volleyball floor sleeves (anchors).
  - 2. Volleyball cover plates and outer rings.

#### B. Related Requirements:

- 1. Section 01 6400: 'Owner-Furnished Products' for furnishing volleyball floor sleeves (anchors), cover plates and outer rings, and volleyball upright (standard) storage unit. This specification establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
- 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of volleyball upright storage unit.
- 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for Installation of volleyball floor sleeves (anchors) in concrete slab.
- 4. Section 09 6466: 'Wood Athletic Flooring' for installation of volleyball cover plates and outer ring by wood floor installer.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

#### A. Sequencing:

- 1. Installation of Owner Furnished volleyball floor sleeves (anchors) by Section 03 3111.
- 2. Installation of flooring material by flooring installer.
- 3. Installation of Owner Furnished volleyball cover plates and outer rings by flooring installer.

#### 1.3 SUBMITTALS

#### A. Action Submittals:

- Product Data:
  - Manufacturer's literature and written installation instructions for volleyball floor sleeves and cover plates and outer rings.

#### PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

#### A. Supplier:

- 1. Category Three National Accounts Supplier. See Section 01 6200 for definitions of Categories:
  - a. American Athletic Inc., Jefferson, IA www.aaispalding.com.
    - Contact Information: Whitey Anson, cell (801) 699-3654, whitey.anson@fotlinc.com or ansongroup@aol.com.

#### B. Volleyball Floor Sleeves (Anchors), Cover Plate And Outer Ring:

- 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Design Criteria:
    - 1) Volleyball system with3 inch outside diameter uprights as required for Owner furnished volleyball standards.
      - a) Volleyball floor plate consists of one (1) floor sleeve and one (1) cover plate.
      - b) Volleyball cover plate has hinged cover that closes to flush with finished flooring when volleyball standards are not use.

- b. Volleyball Floor Sleeves:
  - 1) Description:
    - a) Heavy duty steel tubing with 3-1/16 inch inner diameter.
    - b) Finish: baked blue powder coat finish.
  - 2) Model Number (consists of one (1) sleeve and one (1) cover plate package):
    - a) Cultural Center: Single: Model 408101 by American Athletic.
- c. Volleyball Cover Plate and Outer Ring:
  - 1) Cover Plate: 4-3/4 inch diameter hinged to outer ring.
  - 2) Outer Ring: 6-3/4 inch diameter placed over in floor sleeves.
  - 3) Attached to flooring with provided tapping screws.
  - 4) Finish: chrome plated.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Volleyball Floor Sleeve:
  - 1. New Projects:
    - a. Follow Manufacturer's written installation instructions, details, and dimensions as shown on Construction Drawings.
    - b. Wood Floor:
      - Install top of floor sleeve 1/4 inch minimum to 1/2 inch maximum height below top of finish wood floor
- B. Volleyball Cover Plate and Outer Ring:
  - Follow Manufacturer's written installation instructions and install where shown on Contract Drawings including but not limited to:
    - a. Cover plate shall be seated in outer rig so that it is flush with floor surface when closed.
    - b. Attach to floor with tapping screws.

## SECTION 11 6626 WALL PADDING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Supplied Under This Section:
  - 1. Safety Wall Padding on walls behind basketball backstops.
- B. Related Sections:
  - 1. Section 01 6400: Owner will furnish Safety Wall Padding. This specification establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
  - Section 06 4512: 'Architectural Woodwork Wood Trim' for hardwood trim.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - National Fire Protection Association:
    - a. NFPA 701, 'Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, 2015 Edition).

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Color selection.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - Published installation instructions.
- C. Closeout Submittals:

b.

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Maintenance instructions.
    - Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Manufacturer's product literature.
        - b) Color selections.

## PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Material:
  - 1. Safety Wall Padding:
    - a. Description:
      - 1) Size: 24 inches by 72 inches by 1-1/2 inches minimum thickness.
      - 2) Color:

- a) Emerald '1': Forest Green.
- b. Design Criteria:
  - 1) Padding with 2 inch thick fire retardant neoprene foam:
  - Meet NFPA 701 and ASTM E84 Class A rating for flame-spread and smoke development requirements.
  - 3) Meet CSFM (California State Fire Marshall) approval for flame resistance (California projects only).
  - 4) Cover material: 14 oz polyester laminated vinyl fabric.
  - 5) Bond assembly to 3/8 inch plywood back.
- 2. Approved Product:
  - a. Model 2025 Safety Wall Padding by ADP Lemco.

#### 2.2 ACCESSORIES

- A. Wall Pad Attachment System:
  - 1. Description:
    - a. Attachment without exposed screws or bolts.
  - 2. Approved Product:
    - a. Model 4196 Wall Pad Aluminum full Z-Clip attachment system by ADP Lemco.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

A. Follow Manufacturer's installation instructions.

**END OF SECTION** 

WALL PADDING - 2 - 11 6626

## SECTION 11 6643 SCOREBOARDS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Installed But Not Furnished Under This Section:
  - 1. Scoreboard.
- B. Related Requirements:
  - Section 01 6400: Owner will furnish Scoreboard. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
  - 2. Division 26: 'Electrical' for electrical service.

#### PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Product. See Section 01 6200 for definitions of Categories:
  - 1. Approved Product.
    - a. All Sport 3000 by Daktronics Inc, Brookings, SD www.daktronics.com.
- B. Performance:
  - 1. Design Criteria:
    - a. LCD display with 7 inch high letters.
    - b. 24 inches high by 48 inchwide by 6 inch deep.

PART 3 - EXECUTION: Not Used

END OF SECTION

SCOREBOARDS - 1 - 11 6643

## SECTION 11 9116 BAPTISMAL FONT MIRROR

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install mirror for font viewing, with installation brackets and hardware, as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for installation of wall blocking for font angle brackets.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C1036-16, 'Standard Specification for Flat Glass'.

#### 1.3 QUALITY ASSURANCE

- A. Certifications:
  - 1. Attach label to mirror showing strength, grade, thickness, type, and quality.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLY

- A. Materials:
  - 1. Glass (Mirror):
    - a. Meet requirements of ASTM C1036, Type I, Class I Clear, Quality q2 Mirror or q1 Mirror select.
    - b. Thickness: 5/32 inch minimum (Double Strength).
    - c. Size: 60 inches wide by 42 inches high.
  - 2. Backing:
    - a. Sheathing: 23/32 inch thick minimum exterior APA rated plywood.
    - b. Back Frame: 1 by 6 inch: Hardwood.
  - 3. Channel Frame:
    - a. Stainless steel, Type 304, with No. 4 polished finish.
  - 4. Fasteners: Stainless steel.
  - 5. Brackets: Stainless steel, Type 304, with No. 4 polished finish.

#### B. Fabrication:

- 1. Coordinate with Construction Drawings:
  - a. Apply back frame to plywood and seal. Install brackets.
  - b. Mount mirror against plywood with suitable mirror setting mastic applied over complete surface and install channel frame with mechanical attachment.

## PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify wall blocking installed in correct location for angle brackets.
  - 2. Notify Architect and Owner in writing if wall blocking not in correct location for angle brackets.
    - a. Do not install font mirror until deficiency in wall blocking have been corrected.

## 3.2 INSTALLATION

A. Install completed assembly as detailed as shown with Construction Drawings.

# SECTION 11 9119 BAPTISMAL FONT RAILING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install glass railing for font viewing, with installation brackets and hardware, as described in Contract Documents

#### 1.2 REFERENCES

- A. Reference Standards:
  - ASTM International:
    - a. ASTM C1048-12, 'Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass'.

#### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.

## 1.4 QUALITY ASSURANCE

- A. Certifications:
  - 1. Attach label to glass showing kind, class, and quality.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum two (2) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
    - b. Upon request, submit documentation.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY

- A. Materials:
  - 1. Glass:
    - a. Meet requirements of ASTM C1048, Kind FT, Class 1, Quality Q4.
    - b. Thickness: 3/4 inch minimum for openings from 7 foot-7 inch to 10 foot 0 inch.
  - . Fasteners:
    - a. Side:
      - 1) No. 12 SDSF Screws at 6 inch on center at wood or steel stud walls.
      - 2) 1/4 inch x 4 inch Screw Anchors at 6 inches on center (pre-drill holes).
    - b. Bottom:
      - 1) 1/4 inch x 8 inch Screw Anchors at 18 inches on center at masonry or concrete (pre-drill holes).
  - 3. Glass Railing Channel:
    - a. 7/8 inch x 7/8 inchfor3/4 inch glass thickness.
      - 1) 18 gauge Stainless steel, Type 304 brushed finish.

## PART 3 - EXECUTION:

## 3.1 INSTALLERS

- A. Class Two Acceptable Installers. See Section 01 6200 for definition of Categories.
  - 1. Use specified product or equal product from any Installer.
  - 2. Products used shall conform to Contract Document requirements.
  - 3. Qualifications Requirements. See Section 01 4301.
- B. Locations:
  - 1. Utah:
    - a. Bountiful Glass, Bountiful, UT: Contact Jeff Pulver (801) 295-3475.
    - b. Jones Paint & Glass, Provo, UT: Contact Brian Clark (374) 6711.
    - c. Mollerup Glass, Salt Lake City, UT: Contact Brent (801) 397-1177.
    - d. Tyler Glass & Mirror, Tyler TX: Contact Shannon (903) 597-6396.
    - e. Western Glass, Ogden, UT: Contact Kaylee (801) 394-1661.



# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

## **DIVISION 12 - FURNISHINGS:**

12 2000 Window Treatments 12 2200 Curtains and Drapes

12 6000 Multiple Seating

12 6713 Pews

DIVISION 12 FURNISHINGS

# SECTION 12 2200 CURTAINS AND DRAPES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To
  - 1. Furnish and install draperies, curtains, and hardware as described in Contract Documents.

#### 1.2 REFERENCES

## A. Definitions:

- 1. Approved Agency: An established and recognized agency that is regularly engaged in conducting tests of furnishing inspection services, where such agency has been approved by the building official.
- 2. Flame-proofing: Process of treating materials chemically so that they will not support combustion.
- 3. Flame Spread. The propagation of flame over a surface.
- 4. Flammable Material: Material capable of being readily ignited from common sources of heat or at a temperature of 600 deg F or less.
- 5. Inherently Flame Resistant: Material that meets requirements set forth in NFPA 701. Inherently flame resistant fabric is woven from fibers that are non-combustible for life of material.

## B. Reference Standards:

- 1. International Building Code (2015 IBC):
  - a. Chapter 8, 'Interior Finishes':
    - 1) Section 806, 'Decorative Materials And Trim':
      - a) 806.4, 'Acceptance Criteria And Reports'.
- 2. National Fire Protection Association:
  - a. NFPA 289, 'Standard Method of Fire Test for Individual Fuel Packages' (2013 Edition).
  - b. NFPA 701, 'Methods of Fire Tests for Flame Propagation of Textiles and Films' (2015 Edition).

# 1.3 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - a. Flame-proofing literature.
- 2. Samples:
  - a. 24 inch wide and 48 inch high sample including all specified elements of finished curtains, including flame retardant certification tag. Do not fabricate Project drapes until sample has been reviewed and approved by Architect.
  - b. Submit sample with Product Data submittal. Sample will serve as standard by which to evaluate Project curtains.

# B. Informational Submittals:

- 1. Certificates:
  - a. Certificate from approved agency showing compliance to IBC 806.4 requirements.
- 2. Qualification Statement:
  - a. Fabricator / Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.

## C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Operating and maintenance instructions.
  - b. Record Documentation:
    - 1) Manufacturers documentation:

- a) Fabric Supplier's literature or cut sheets on fabric.
- b) Curtain Rod Manufacturer's literature or cut sheets.
- c) Color and style selection.
- d) Certificate of compliance from approved agency.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet requirements of IBC 806.4 'Acceptance Criteria And Reports':
    - a. Where required to exhibit improved fire performance, curtains, draperies, fabric hangings and similar combustible decorative materials suspended from walls or ceilings shall be tested by an approved agency and meet the flame propagation performance criteria of Test 1 or 2, as appropriate, of NFPA 701, or exhibit maximum heat release rate of 100 kW when tested in accordance with NFPA 289, using 20 kW ignition source. Reports of test results shall be prepared in accordance with test method used and furnished to building official upon request.
  - 2. Attach permanent tag to each panel attesting to flame retardant quality of material used.

#### B. Qualifications:

- Fabricator / Installer: Requirements of Section 01 4301 applies, but not limited to following:
  - a. Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
  - b. Upon request, submit documentation.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Manufacturers / Suppliers:
  - 1. Conso / Wright, West Warren, MI www.conso.com.
  - 2. Fred Krieger & Co. Inc., Jericho, NY www.fredkriegerfabrics.com.
  - 3. Graber Div of Springs Industries, Montgomery, PA www.graberblinds.com.
  - 4. Hanes Fabric Co, Conover, NC www.hanesfabric.com.
  - 5. InterSpec, Allenwood, NJ (800) 526-2800 or (732) 938-4114.
  - 6. Kirsch Co, Freeport, IL www.kirsch.com.
  - 7. Rockland Industries Inc, Baltimore, MD www.roc-lon.com.
  - 8. Rowley Co, Gastonia, NC. www.rowleyco.com.

# B. Materials:

- Design Criteria:
  - a. Curtains and draperies must meet flame propagation performance requirements as specified in Quality Assurance in Part 1 of this specification.
- 2. Fabric:
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - 1) Casements:
      - a) Handcart by Fred Krieger: White, Snow.
      - b) Layton by InterSpec: White.
    - 2) Blackout Drapery.
      - a) FlameTrol 540 White by Hanes.
      - b) Roc-Lon Budget Blackout (3-pass) FR, white/white by Rockland Industries.
- 3. Crinoline / Buckram:
  - a. Heavy or Extra Heavy grade, 4 inches wide, woven permanent goods.
  - b. Type Two Acceptable Products:
    - 1) BW74 by R H Rowley Co.
    - 2) 61421 by Conso.
    - 3) Equal as approved by Architect before use. See Section 01 6200.
- 4. Drapery Hooks: Stainless steel, standard 1-1/2 inch hook with pointed hook top.

## 5. Drapery Rods:

- a. Outside Mount:
  - .) Rods shall be sufficient width, window width plus 1/3, to allow drape to stack clear of window opening but no wider. This requirement may be modified as follows:
    - a) Where Drawings detail differently.
    - b) Where wall, cabinets, mechanical equipment, or other obstruction requires modification.
    - where symmetry of room would indicate desirability of exception.
- b. Traverse rods shall include wall or floor mounted tension pulleys for endless cord operation.
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
  - 1) Kirsch:
    - a) 'Super Fine': Less than 15 feet long.
    - b) 'Architrac': 15 feet long and longer.
  - 2) Graber Super Heavy Duty 600 Series by Springs Industries.

## C. Fabrication:

- 1. Double top and bottom hems unless specifically specified otherwise.
- 2. Provide necessary weights at seam and side hems.
- 3. Fullness shall be minimum of 2-1/2 times width of space covered by drape.
- 4. Space pleats 4 inches maximum center of pleat to center of pleat.
- Drapes shall have:
  - a. Fabric inspected over back-lite table for flaws.
  - b. Straight, even blind-stitched side and bottom hems.
  - c. Seams hidden beside pleats.
  - d. Joined seams serged and overcast with no puckering.
  - e. 4 inch double bottom hems and headings.
  - f. 1-1/2 inches (38 mm) double side hem.
  - g. 2 inch overlap, total of 4 inches on pair.
  - h. Stack-off of 1/3 of window width.
  - i. Specified woven, permanent crinoline / buckram used in heading.
  - j. Seams match up on bottom hems.
  - k. Corners of bottom hems closed with hand stitching.
  - I. Pleats evenly spaced to size.
  - m. Straight edge across top after pleating.
  - n. Straight, even folds.
  - o. Polyester thread matching fabric color for seams and hems.

# PART 3 - EXECUTION

# 3.1 FABRICATORS

- A. Acceptable Fabricators:
  - 1. Meet Quality Assurance Fabricator / Installer Qualifications as specified in Part 1 of this specification.

# 3.2 INSTALLATION

- A. Install tracks, wall or ceiling mount, with mounting device head no larger than No. 6, to yield direct withdrawal strength of 25 lbs minimum.
- B. Support spacing to be as recommended in Manufacturer's literature.
- C. Install blackout drapery as a separate drape on separate rod behind primary drape.

## 3.3 CLEANING

A. Tracks to be free of marring, scratches, and foreign material.

# SECTION 12 6713 PEWS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Related Requirements:
  - 1. Section 01 1200: Owner will furnish and install Pews. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
  - 2. Section 01 4301: Quality Assurance Qualifications.
  - 3. Section 09 9324: 'Interior Clear-Finished Hardwood' for pew finish.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM B633-15, 'Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel'.
    - b. ASTM E488/E488M-15, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
    - c. ASTM F1554-15, 'Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
  - 2. Coordinate completion of pews.
- B. Sequencing:
  - 1. Install pews after the following as been completed:
    - a. Adjacent walls and ceilings are finished and painted.
    - b. Adjacent hardwood trim installed and finished.
    - c. Carpet flooring has been installed.
- C. Scheduling:
  - 1. Notify Manufacturer early in project schedule when pews will be ready for installation.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - 1) Approval subject to Annual Review:
        - a) Prepare sample to match Control Sample available from Owner to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
        - b) Approval of sample by Owner will establish performance standard of stain to be used until next annual review.
      - 2) Design Criteria:
        - a) Provide 8 inch by 10 inch sample of Red Oak to match stain Control Sample provided by Owner.
- B. Informational Submittals:
  - 1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.

- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include final, executed copy of warranty.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements: Requirements of Section 01 6600 applies, but not limited to the following:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Deliver in Manufacturer's original, unopened package(s).
    - b. Handling and unloading.
    - c. Replace damaged materials at no cost to Owner.
- B. Storage And Handling Requirements:
  - 1. Owner-Furnished Product Manufacturer's Responsibility:
    - a. Protect pews from damage during installation.

## 1.6 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's warranty against defects for five (5) years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturer. See Section 01 6200 for definitions of Categories:
  - 1. Marshall Company, Payette, ID www.marshallpews.com.
- B. Performance:
  - 1. Design Criteria:
    - a. Wood Exposed To View: Solid FAS grade Appalachian grown oak with 6 percent maximum moisture content during construction and hand sorted for uniform texture and color matching. No mineral grains will be acceptable.
    - b. Pew Type:
      - 1) Upholstered Seat And Back.
- C. Materials:
  - Red Oak.
  - 2. Wood Thickness:
    - a. Ends: 1-3/4 inches minimum thickness.
    - b. Supports: 1-1/4 inches minimum thickness.
  - 3. Foam: 1.8 lbs per cu ft density polyurethane foam with minimum ILD of 45 lb for seats and 32 lbs for backs.
  - 4. Upholstery Color And Pattern:
    - a. Emerald '1': Chatham Revival 47002, 0717 Emerald.
  - 5. Glue: U S Plywood JMK514, Prestoset, Weldwood, Perkins L-100, or Architect approved equal.
  - 6. Hymn Book Racks: Of size to receive two hymn books. Provide one rack between each pair of supports.
  - Miscellaneous Hardware: Manufacturer to supply necessary screws, washers, and miscellaneous hardware for complete pew assembly and installation.
- D. Pew Anchors:
  - 1. Design Criteria:
    - a. Concrete Anchors:
      - 1) Concealed fastener.
      - 2) Anchors required at each pew end or end support.
      - 3) Figure '8' clips or angles are not acceptable.
      - 4) Meet requirements of ASTM E488/E488M for testing expansion anchors in concrete.
      - 5) Meet requirements of ASTM B633 for corrosion protection coating.

- 6) Conform to ASTM F1554 for carbon steel threaded rod tension resistance.
- 7) Meet requirements of GSA: A-A-55614 Type 2 (Formerly GSA: FF-S-325 Group VIII, Type 2).
- 8) Provide compression strength of 4000 psi.
- 9) Factory Mutual and Underwriters Laboratories approved.
- 10) Type Two Acceptable Products:
  - a) Chicago Expansion Bolt (CEB) Type 2100.
  - b) Red Head JS14M 1/4 inch x 3-1/4 inch Stud Anchor.
  - c) Equal as approved by Owner before installation.
- b. Wood Anchors:
  - 1) Anchors required at each pew end or end support.
  - 2) 1/4 inch3 inch Machine and Wood Threaded Lag Bolt.

## E. Fabrication:

- 1. Pew Body:
  - a. Assemble with specified lumber in random widths and lengths.
  - b. Tongue and groove joints are preferred, however, butt joints with glue line rip saw are acceptable providing Manufacturer will guarantee satisfactory performance.
  - c. Pew bodies 150 inches or less in length shall be one piece. Longer pews may be assembled with blind joint. Joint shall occur over support.
- Pew Ends:
  - a. Rift block construction is preferred however, edge-glued construction is acceptable provided Manufacturer will guarantee satisfactory performance.
  - b. Minimum Thickness: 1-3/4 inches.
  - c. Wedge and screw pew body to end.
- 3. Pew Supports
  - a. Rift block or edge-glued construction of 1-1/4 inches minimum thickness.
  - b. Terminate supports within 2 inches of cap rail.
  - c. Seat and back shall be in full contact with support member so no wedging is required at seat and no molding is required to hide joint with pew back.
  - d. 72 inches maximum spacing between supports.

#### F. Finishes:

- 1. Stain:
  - a. Description:
    - 1) Penetrating, non-fading sealer-stain hand wiped to obtain best possible uniform color.
  - b. Performance / Design Criteria:
    - 1) Factory-finish to match Owner provided sample as specified in Section 09 9324.
  - c. Color:
    - 1) LDS Cherry.
  - d. Filler: Use of filler is not required if high quality finish can be achieved without it.
  - e. Sealer: Apply one (1) hot coat of lacquer sealer followed by hand sanding with No. 240 wet or dry paper.
  - f. Apply three (3) coats of lacquer using no reducer to thin material. Lightly sand between coats.
  - g. Finish surface shall be free of skips, runs, sags, or lacquer dust.

#### 2.2 SOURCE QUALITY CONTROL

- A. Inspections:
  - 1. Identification:
    - a. Permanently identify Manufacturer's name, address, model, and fabric color on under side of each pew.
  - 2. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Pew Attachment:
  - General:
    - a. Follow Manufacturer's written installation instructions.

- b. Spacing and alignment shall be uniform and true.
- c. When installing over carpet, punch holes through carpet with hollow cutting tool. Do not drill thru carpet.
- 2. Concrete Installation:
  - a. Attachment to floor with anchors at each pew end or pew support.
  - b. Embed anchor 1-3/4 inches.
  - c. Drill hole same diameter as anchor to depth equal to embedment required:
    - 1) Tolerances of drill bit used should meet requirements of ANSI B212.15.
    - 2) Do not over drill hole.
    - 3) Clean hole.
  - d. Drive anchor with expander plug in bottom.
  - e. Expand anchor by driving anchor over plug with hammer.
- 3. Wood Installation (Rostrum):
  - a. Attachment to floor with two (2) anchors at each pew end or pew support required.
  - b. Embed 'Machine and Wood Threaded Lag Bolt' to 1-1/2 inches depth.
- 4. Secure pew end or pew support to floor.

## 3.2 CLEANING

#### A. General:

- 1. Owner-Furnished Product Manufacturer's Responsibility:
  - a. Clean any soiling of pews as recommended by Manufacturer or any surrounding areas caused by installation of pews.

# B. Building Damage:

- 1. Owner-Furnished Product Manufacturer's Responsibility:
  - a. Installer responsible for repair of all damaged surfaces to their original condition from pew installation.

## C. Waste Management:

- 1. Contractor's Responsibility:
  - a. Provide Dumpster as required in Section 01 7400.
- 2. Owner-Furnished Product Manufacturer's Responsibility:
  - a. All work areas are to be kept clean, clear and free of debris at all times.
  - b. Disposal of rubbish, debris, and packaging materials to Contractor provided Dumpster.

## 3.3 PROTECTION

## A. General:

- 1. Contractor's Responsibility:
  - a. Upon completion of pew installation, protect pews from damage and replace or repair subsequent damage at no cost to Owner.



# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

# DIVISION 21 - FIRE SUPPRESSION

21 1000 Water-Based Fire Suppression Systems 21 1313 Wet-Pipe Sprinkler Systems

# SECTION 21 1313 WET-PIPE SPRINKLER SYSTEMS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete wet-pipe fire sprinkler system as specified in Contract Documents.
  - 2. Furnish and install Firestop Penetration Systems for fire sprinkler system penetrations as described in Contract Documents.
  - 3. Install sealant at all dry sprinkler penetrations.
- B. Related Requirements:
  - 1. Section 07 8400: Quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 2. Section 28 3101: Fire Detection and Alarm Annunciation Panels including connection of tamper switches and flow detectors to alarm system and furnishing and installing of low temperature switch.
  - 3. Section 33 1119: Fire Suppression Utility Water Distribution Piping.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. Underwriters Laboratories, Inc.:
    - a. UL Directory B, 'Fire Protection Equipment Directory' (2011).
- B. Reference Standards:
  - 1. American National Standards Institute / American Society of Mechanical Engineers:
    - a. ANSI/ASME B1.20.1-1983(R2006), 'Pipe Threads, General Purpose (Inch)'.
    - b. ANSI/ASME B16.1-2010, 'Cast Iron Pipe Flanges and Flanged Fittings'.
    - c. ANSI/ASME B16.3-2011, 'Malleable Iron Threaded Fittings: Classes 150 and 300'.
    - d. ANSI/ASME B16.4-2011, 'Gray Iron Threaded Fittings, Classes 125 and 250'.
    - e. ANSI/ASME B16.5-2009, 'Pipe Flanges and Flanged Fittings'.
  - 2. American National Standards Institute / American Water Works Association:
    - a. ANSI/AWWA C606-11, 'Grooved and Shouldered Joints'.
  - 3. American National Standards Institute / American Welding Society:
    - a. ANSI/AWA B2.1/B2.1M-2009, 'Specification for Welding Procedure and Performance Qualification'.
  - 4. ASTM International:
    - ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'
    - b. ASTM A135/A135M-09, 'Standard Specification for Electric-Resistance-Welded Steel Pipe'.
    - c. ASTM A234/A234M-11a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
    - d. ASTM A395/A395M-99(2009), 'Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures'.
    - e. ASTM A536-84(2009), 'Standard Specification for Ductile Iron Castings'.
    - f. ASTM A795/A795M-08, 'Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use'.
  - 5. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 13: 'Standard for the Installation of Sprinkler Systems', (2013 Edition).
    - b. NFPA 24: 'Installation of Private Fire Service Mains and their Appurtenances', (2013 Edition).
    - NFPA 25: 'Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems', (2014 Edition).
    - d. NFPA 101: 'Life Safety Code', (2012 Edition).

# 1.3 SUBMITTALS

- A. Action Submittals:
  - Shop Drawings:

- a. Size sprinkler system by the following method:
  - 1) Hydraulic calculation design method based on water supply evaluation performed at building site.
- b. On submittals, refer to sprinkler heads by sprinkler identification or model number published in appropriate agency listing or approval. Trade names and other abbreviated designations are not acceptable.
- c. Submittal Procedure:
  - After award of Contract and before purchase of equipment, submit seven sets of shop drawings with specifications and hydraulic calculations to Architect and two sets to local jurisdiction having authority for fire prevention for review. If pipe schedule method is used, submit copies of schedules in NFPA 13 used in sizing pipe.
  - After integrating Architect's and AHJ's comments into drawings, licensed certified fire protection
    engineer of record who designed fire protection system shall stamp, sign, and date each sheet of shop
    drawings and first page of specifications and calculations.
  - 3) Submit stamped documents to Owner and to AHJ for fire prevention for final approval.
  - 4) After final approval, submit four copies of approved stamped documents to Architect.
  - 5) Failure of system to meet requirements of authority having jurisdiction and/or approved stamped construction documents shall be corrected at no additional cost to Owner.

## B. Informational Submittals:

- Qualification Statement:
  - a. Licensed fire protection engineer or fire protection system designer:
    - 1) Licensed for area of Project.
    - 2) Certified by NICET to level three minimum.
    - 3) Provide Qualification documentation if requested by Architect or Owner.
  - b. Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.

## C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Maintenance and instructions.
      - a) List of system components used indicating name and model of each item.
      - b) Manufacturer's maintenance instructions for each component installed in Project.
      - c) Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
  - b. Warranty Documentation:
    - 1) Include copies of required warranties.
  - c. Record Documentation:
    - 1) Include copies of approved shop drawings.
    - 2) Provide master index showing items included.
    - 3) Provide name, address, and phone number of Architect, Architect's Fire Sprinkler Consultant, General Contractor, and Fire Protection subcontractor.
    - 4) Provide operating instructions to include:
      - a) General description of fire protection system.
      - b) Step by step procedure to follow for shutting down system or putting system into operation.
    - 5) Provide copy of system's above ground and below ground hydrostatic tests. Provide separate copies for Architect and Owner.
    - 6) Provide copy of 'Contractor's Material and Testing Certificate for Above Ground Piping' NFPA 13, Figure 25.1 (2013 edition).
- 2. Inspection:
  - a. Provide Owner with latest version of NFPA 25.

# D. Maintenance Material Submittals;

- Extra Stock Materials:
  - a. Spare sprinkler heads in the quantity recommended by NFPA 13 selected in representative proportion to quantity used in Project and in accordance with NFPA 13 (Twelve (12) spare sprinkler heads minimum). Do not include dry barrel Pendent and dry barrel Sidewall sprinkler heads.
  - b. Provide spare heads in cabinet with sprinkler head wrench for each type of head used. After approval of cabinet and contents, mount cabinet in convenient location in Riser Room.

# 1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

- 1. Unless noted otherwise, system shall conform to:
  - a. NFPA 13, 'Light & Ordinary Hazard Occupancies'.
  - b. NFPA 24, 'Service Mains and Their Appurtenances, Private'.
  - c. NFPA 25, 'Inspection, Testing, and Maintenance.
  - d. NFPA 101, 'Life Safety Code'.
  - e. Requirements of local water department and local authority having jurisdiction for fire protection.
  - f. Underwriters Laboratories Publication, UL Directory B, 'Fire Protection Equipment Directory', current edition at time of Pre-Bid Meeting.
  - g. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.
  - h. Applicable rules, regulations, laws, and ordinances.

## B. Qualifications:

- 1. Licensed fire protection engineer or fire protection system designer certified by NICET to level three minimum and engaged in design of fire protection systems. Engineer / designer shall:
  - a. Licensed for area of Project.
  - b. Minimum five (5) years experience in fire protection system installations.
  - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
  - d. Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
  - e. Make complete inspection of installation.
  - f. Provide corrected record drawings to Owner with letter of acceptance.
  - g. Certify that installation is in accordance with Contract Documents.
  - h. Upon request, submit documentation.

#### Installer:

- a. Licensed for area of Project.
- b. Minimum five (5) years experience in fire protection system installations.
- c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
- d. Upon request, submit documentation.

## PART 2 - PRODUCTS

# 2.1 SYSTEM

# A. Manufacturers:

- 1. Manufacturer Contact List:
  - a. Croker Corp, Elmsford, NY www.croker.com.
  - b. Gruvlock by Anvil International, Portsmouth, NH www.anvilintl.com.
  - c. HO Trerice Company, Oak Park, MI www.hotco.com.
  - d. Kennedy Valve, Elmira, NY www.kennedyvalve.com.
  - e. Milwaukee Valve Co, New Berlin, WI www.milwaukeevalve.com.
  - f. Mueller Company, Decatur, IL www.muellerflo.com.
  - g. Nibco Inc, Elkhart, IN www.nibco.com.
  - h. Notifier by Honeywell, Northford, CT www.notifier.com.
  - i. Potter Electric Signal Company, St. Louis, MO www.pottersignal.com.
  - j. Potter-Roemer, Cerritos, CA www.potterroemer.com.
  - k. Reliable Automatic Sprinkler Co, Mount Vernon, NY www.reliablesprinkler.com.
  - I. System Sensor, St Charles, IL www.systemsensor.com.
  - m. TYCO Fire & Building Products, Lansdale, PA www.tyco-fire.com.
  - victualic Company of America, Easton, PA or Victualic Company of Canada, Rexdale, ON www.victaulic.com.
  - o. Viking Corp, Hastings, MI www.vikingcorp.com.

## B. Description:

- Automatic wet-pipe fire sprinkler system starting at flange in Fire Riser Room and extending throughout heated portions of building.
- 2. Dry sprinkler heads preferred into Vestibules.

# C. Performance:

- 1. Design Criteria:
  - a. Area of Application and Corresponding Design Density:
    - 1) Serving Area and Mechanical, Electrical, and Janitorial Areas:
      - a) Ordinary Hazard Group 1.
      - b) Design density = 0.15 gpm per sq ft over 1,500 sq ft.
    - 2) Storage Areas:
      - a) Ordinary Hazard Group 2.
      - b) Design density = 0.20 gpm per sq ft over 1,500 sq ft.
    - 3) All Other Areas:
      - a) Light Hazard.
      - b) Design density = 0.10 gpm per sq ft over 1,500 sq ft.
    - 4) Increase remote areas by 30 percent where ceiling / roof is sloped more than 2 inches per ft.
    - 5) Remote areas may be reduced within parameters indicated in NFPA 13 for use of quick response sprinklers throughout.
  - b. Maximum Coverage per Sprinkler Head:
    - 1) Ordinary Hazard Areas: 130 sq ft.
    - 2) Attic Areas: 120 sq ft.
    - 3) Light Hazard Areas: 225 sq ft.
  - c. Design Area shall be hydraulically most remote area in accordance with NFPA 13.
    - 1) Provide a 10% safety allowance under adjusted water flow supply curve.
  - d. Maximum velocity of water flow within piping: 20 feet per sec.

## D. Components:

- General: Use only domestically manufactured cast iron pipe fittings, valves, sprinkler heads, and other components.
  - a. Pipe of foreign manufacture that meets ASTM Standards is acceptable.
  - b. Ductile iron fittings of foreign manufacture are acceptable.
- 2. Pipe:
  - a. Schedule 40 Welded Steel:
    - Exterior, Above Ground: Schedule 40 hot-dip galvanized welded steel meeting requirements of ASTM A53/A53M, ASTM A135/A135M or ASTM A795/A795M.
    - Interior, Above Ground: Schedule 40 black welded steel meeting requirements of ASTM A53/A53M, ASTM A135/A135M or ASTM A795/A795M.
    - 3) Connections:
      - a) 2 inches And Smaller: Screwed, flanged, or roll grooved coupling system.
      - b) 2-1/2 inches And Larger: Flanged or roll grooved coupling system.
- 3. Fittings:
  - a. Usage:
    - 1) 2 inches And Smaller: Welded, screwed, flanged, or roll grooved coupling system. For use with schedule 40 carbon steel pipe.
    - 2) 2-1/2 inches And Larger: Welded, flanged, or roll grooved coupling system.
  - b. Types And Quality:
    - 1) Screwed:
      - a) Cast iron meeting requirements of ANSI B16.4 or ductile iron meeting requirements of ANSI B16.3 and ASTM A536, Grade 65-45-12.
      - b) Threaded fittings and pipe shall have threads cut to ANSI B1.20.1.
      - c) Do not extend pipe into fittings to reduce waterway.
      - d) Ream pipe after cutting to remove burrs and fins.
    - 2) Flanged: Steel meeting requirements of ANSI B16.5.
    - 3) Welded:
      - a) Carbon steel meeting requirements of ASTM A234/A234M.
      - Weld pipe using methods complying with AWS B2.1, level AR-3. Welding procedures and performance of welders shall comply with AWS B2.1, level AR3.
    - 4) Roll Grooved Pipe Coupling System:
      - a) Ductile iron meeting requirements of ASTM A395/A395M and ASTM A536, and UL listed.
      - b) Grooved products used on Project shall be from same manufacturer. Grooving tools shall be as recommended by manufacturer of grooved products.
      - c) Category Four Approved Products: See Section 01 6200 for definition of Categories:

	Gruvlok	Tyco (Grinnell)	Victaulic
Rigid Couplings	7401	772	Style 005
Flexible Couplings <sup>1</sup>	7000	705	Style 75
Flange Adaptors <sup>2</sup>	7012	71	Style 744

Grooved Coupling Gaskets 3	'E' EPDM	Grade 'E' EPDM	'E' EPDM <b>4</b>

- <sup>1</sup> Use in locations where vibration attenuation, stress relief, thermal expansion, or seismic design is required / needed.
- <sup>2</sup> Class 125 or 150.
- <sup>3</sup> Temperature rated 30 to 150 deg F. NSF-61 certified.
- 4 Grade 'A'.
- c. Use of saddle or hole cut type mechanical tees is NOT APPROVED.
- 4. Valves:
  - a. Butterfly Valves:
    - 1) Design Criteria:
      - a) UL / CASA approved.
      - b) Indicating type.
    - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
      - a) Milwaukee:
        - (1) Model BB-SCS02 threaded ends with tamper switch one inch to 2 inches.
        - (2) Model BBVSCS02 Grooved ends with tamper switch 2 inches to 2-1/2 inch.
      - b) Nibco:
        - (1) Model WD3510-8 Wafer type with valve tamper switch.
        - (2) Model GD4765-8N Grooved type with valve tamper switch, 2-1/2 inches to 8 inches.
      - c) Tyco (Grinnell):
        - (1) Model BFV-N wafer.
        - (2) Model BFV-N grooved.
      - d) Victaulic: Series 705W Grooved end type with internal supv. switches.
      - e) Kennedy:
        - (1) Model 01W wafer.
        - (2) Model G300 grooved.
  - b. Gate Valves:
    - 1) Design Criteria:
      - a) UL / CASA approved.
      - b) Outside Screw and Yoke Type (O.S.&Y).
      - c) Class 150 psi.
    - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
      - a) Nibco:
        - (1) T-104-0 with Threaded Ends 1/2 inch to 2 inches.
        - (2) F-637-31 Flanged Ends.
      - b) Mueller: R-2360-6 Flanged Ends.
      - c) Victaulic: Series 771 Grooved Ends
  - c. Ball Valves:
    - 1) Design Criteria:
      - a) UL / CASA approved.
      - b) Valve tamper switch.
      - Category Four Approved Products: See Section 01 6200 for definitions of Categories:
        - a) Milwaukee: BB-SCS02 with threaded ends.
        - b) Nibco: KT-505 with threaded ends.
        - c) Nibco: KG-505 with grooved ends.
        - d) Victaulic: Series 728 with grooved or threaded ends.
  - d. Swing Check Valves:
    - ) 1/2 to 3 inch horizontal check.
      - a) Design Criteria:
        - (1) Regrinding type.
          - (2) Renewable disk.
          - (3) Bronze Class 125 with threaded ends.
      - b) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
        - (1) Nibco: KT-403-W.
        - (2) Victaulic: Series 712.
        - (3) Viking: G-1 Grooved ends.
    - 2) 2 to 4 inch Horizontal check:
      - a) Design Criteria:
        - (1) Grooved ends.
        - (2) Ductile iron body.
        - (3) Rated 300 psi.
      - b) Category Four Approved Products: See Section 01 6200 for definitions of Categories:

- (1) Tyco (Grinnell): CV-1F Grooved ends.
- Victaulic: Series 712. (2)
- Viking: G-1 Grooved ends. (3)
- 3 to 12 inch Horizontal check: 3)
  - Design Criteria:
    - Bolted bonnet. (1)
    - Raised face flanges. (2)
    - (3)Bronze mounted with ductile iron body.
    - (4) 125 lb Class A.
  - Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - Nibco: F-938-31.
    - Mueller: A-2120-6. (2)
    - (3) Viking: F-1 grooved and flanged.
- Wafer Type Check Valves:
  - Design Criteria:
    - 4 to 8 inch cast iron body.
    - 175 psi minimum working pressure.
    - Rubber Seat.
  - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - Nibco: KW-900-W.
    - Mueller: A-2102.
    - Kennedy: Fig.706. c)
- Grooved-End Check Valves: f.
  - Design Criteria:
    - UL / CASA listed and approved to 250 psi maximum operating pressure.
    - 2-1/2 to 12 inch ductile iron body.
    - Disc And Seat:
      - (1)2-1/2 And 3 Inch: Aluminum bronze disc with mounted elastomer seal and PPS (polyphenylene sulfide) coated seat.
      - 4 Inch and Larger: Elastomer encapsulated ductile iron disc with welded in nickel seat.
      - Viking: Model VK462.
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories: 2)
    - Nibco: KG-900-W grooved ends.
    - b) Victaulic: Series 717.
    - c) Kennedy: Fig.426.
- Alarm Check Valves: g.
  - Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - Reliable: E with gauges and drain.
    - Tyco (Grinnell): Model AV-1-300. b)
    - Victaulic: Series 751 with gauges and drain. c)
    - Viking: J-1 with gauges and drain.
- Backflow Preventer: Make and model shown on Drawings or as required by local codes. h.
- Retard Chamber:
  - Design Criteria: 1)
    - Self-draining.
  - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - Reliable: E-1.
    - Victaulic: Series 752.
    - c) Viking: C-1.
- Inspector's Test Valve: j.
  - Design Criteria:
    - - Bronze body with threaded or grooved ends.
      - Combination sight glass / orifice.
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories: 2)
    - Tyco (Grinnell): Model F350.
    - b) Victaulic: Testmaster Alarm Test Module Style 720.
- 5. Sprinkler Heads:
  - Concealed Pendant: a.
    - Design Criteria:
      - Flat Profile Adjustable cover. a)
      - UL / CASA listed and approved. b)
      - Coordinate concealed cover finish with Architect.
    - Type One Acceptable Products:

- a) Wet Pendant:
  - (1) Reliable: F4FR.
  - (2) Victaulic: Model 3802.
  - (3) Viking: Model VK462.
  - (4) Tyco (Grinnell): Model RFII.
  - (5) Equal as approved by Architect before bidding. See Section 01 6200.
- b) Drv Pendant:
  - (1) Flat Profile:
    - (a) Tyco (Grinnell): DS-C.
    - (b) Victaulic: V3618.
    - Equal as approved by Architect before bidding. See Section 01 6200.
- b. Horizontal Sidewall Sprinkler:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
    - b) Where guards are required, use chrome plated sprinkler guards that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
  - 2) Type One Acceptable Products:
    - a) Wet System:
      - (1) Reliable: F1FR.
      - (2) Tyco (Grinnell): Model TY-FRB.
      - (3) Victualic: Model V2710.
      - (4) Viking: VK305.
      - (5) Equal as approved by Architect before bidding. See Section 01 6200.
- c. Dry Horizontal Sidewall Sprinkler:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
    - b) Recess adjustable.
  - 2) Type One Acceptable Products:
    - a) Wet System:
      - (1) Reliable: F3QR.
      - (2) Tyco (Grinnell): DS-1.
      - (3) Victualic: Model V3610.
      - (4) Viking: VK182.
      - (5) Equal as approved by Architect before bidding. See Section 01 6200.
- d. Attic Sprinklers, Upright:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
    - b) Approved for use in roof structures, combustible and non-combustible, with ceiling below.
  - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - a) Tyco: BB, SD, or HIP.
- e. Pendant Sprinklers:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
    - b) Where guards or escutcheons are required, use chrome plated sprinkler guards and escutcheons that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
  - 2) Type One Acceptable Products:
    - a) Reliable: F1FR.
    - b) Tyco: TY-FRB.
    - c) Victaulic: Model V2704.
    - d) Viking: VK302.
    - e) Equal as approved by Architect before bidding. See Section 01 6200.
- f. Upright Sprinklers:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
  - 2) Type One Acceptable Products:
    - a) Reliable: F1FR.
    - b) Tyco: TY-FRB.
    - c) Victaulic: Models V2704.
    - d) Viking: VK300.
    - e) Equal as approved by Architect before bidding. See Section 01 6200.
- 6. Water Flow Alarm:

- a. Electric Flow Alarm:
  - 1) Design Criteria:
    - a) UL / CASA listed and approved.
  - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - a) Potter Electric: Horn Strobe, SASH-120, 120VAC.
    - b) System Sensor: Horn Strobe, P2RHK-120, 120 VAC.
- 7. Pressure Gauges:
  - a. Mechanical Water Pressure Gauges:
    - 1) Design Criteria:
      - a) UL / CASA listed and approved.
      - b) 3-1/2 inch diameter dial.
      - c) 0 to 300 psi in 5 psi increments.
    - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
      - a) Reliable: UA.
      - b) HO Trerice: 500.
      - c) Viking: 01124A.
- 8. Waterflow Detectors:
  - a. Electrical Water Flow Switch:
    - 1) Design Criteria:
      - a) UL / CASA listed.
      - b) Switch activates with flow of 10 gpm or more.
      - c) Two single pole double throw switches.
      - d) Automatic reset.
    - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
      - a) Potter-Roemer: Model 6201 thru 6208.
      - b) System Sensor: WFD20 thru WFD80.
      - c) Viking: VSR-F.
- 9. Tamper Switch
  - a. Weather and Tamper Resistant Switch.
    - Design Criteria:
      - a) UL / CASA listed.
      - b) Mount to monitor valve and not interfere with operation.
      - c) Shall operate in horizontal and vertical position.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Control Valves, Butterfly Valves, Post Indicator Valves:
        - (1) Potter Electric: Model PCVS.
        - (2) Notifier: Model PIBV2.
        - (3) System Sensor: Model PIBV2.
      - b) O.S. & Y Valves:
        - (1) Potter Electric: Model OSYSU.
        - (2) System sensor: Model OSY2.
- 10. Automatic Drain Device:
  - a. Design Criteria:
    - 1) Straight Design, 3/4 inch: (19 mm).
  - b. Category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - 1) Nibco: Ball-Drip.
    - 2) Potter-Roemer: Figure 5982.
    - 3) Viking: B-1.
- 11. Fire Department Connection:
  - a. Two-way Sidewalk Siamese Inlet Connection with double clappers:
    - ) Class One Quality Standards: See Section 01 6200:
      - a) Cast brass inlet connection.
      - b) Round identification plate.
      - c) Caps and chains.
      - d) Brass sleeve.
      - e) Rough chrome plated finish:
        - (1) Croker: Fig 6510-RC.
        - (2) Potter-Roemer Fig. 5761-C
- 12. Indicating Post Valve:
  - a. Design Criteria:
    - 1) As specified in Section 33 1119: 'Fire Suppression Water Distribution Piping'.
    - 2) Prefer exposed parts non-brass, for theft protection.
    - 3) Supervisory switch.

- c. Category Four Approved Products: See Section 01 6200 for definitions of Categories:
  - As required by Authority Having Jurisdiction (AHJ).
- 13. Riser Manifold Assembly:
  - a. Design Criteria:
    - 1) Groove x Groove Manifold Body.
    - 2) Water Flow Alarm Switch, VSC with Vane, UL / CASA listed and approved.
    - 3) 300 psi Water Pressure Gauge.
    - 4) Test and Drain Valve with Manifold Drain Trim and 1/2 inch diameter test Orifice.
    - 5) Pressure Relief Valve, 175 psi, non adjustable, pipe discharge to test Drain Valve.
  - category Four Approved Products: See Section 01 6200 for definitions of Categories:
    - 1) Tyco: Model 513.
    - 2) Victaulic: Style 747P.

#### 2.2 ACCESSORIES

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Anvil International, Portsmouth, NH www.anvilintl.com.
    - b. Cooper B-Line, Highland, IL www.b-line.com.
- B. Hangers, Rods, And Clamps:
  - Design Criteria:
    - a. Galvanized, unless specified otherwise, and UL / CASA approved for service intended.
  - 2. Class One Quality Standard:
    - a. Hangers and accessories shall be Anvil numbers specified or equals by Cooper B-Line.
    - b. Pipe Ring Hangers: Equal to Anvil Fig 69.
    - c. Riser Clamps: Equal to Anvil Fig. 261.
- C. Posted System Diagram:
  - 1. Provide single, color-coded floor plan diagram showing total system. Color antifreeze pipe system elements BLUE and wet pipe system elements RED. Indicate locations of antifreeze system drains and sample test station.
  - 2. Include following information on diagram sheet:
    - a. Explanation of how to test an antifreeze system.
    - b. Step by step shut down procedure.
    - c. Step by step system drainage procedure.
    - d. Step by step start-up procedure.
    - e. Step by step procedure for protection of system from freezing.
  - 3. Laminate diagram with plastic and mat or frame suitable for hanging near riser.

# PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Acceptable Installers. See Section 01 4301:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

## 3.2 EXAMINATION

- A. Drawings:
  - 1. Fire Protection Drawings show general arrangement of piping. Follow as closely as actual building construction and work of other trades will permit. Install system so it drains.
  - Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These Drawings take precedence over Fire Protection Drawings.
  - 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions and to enable system to drain.

## 3.3 INSTALLATION

- A. Connect system to flange provided under Section 33 1119. After installation of riser, fill annular space between pipe and slab with flexible mastic.
- B. Install sprinkler systems in accordance with requirements of latest editions of NFPA 13 and as specified below:
  - 1. Provide maintenance access to equipment
  - 2. Conceal sprinkler lines installed in occupied areas. In Mezzanine areas, route pipe to side or underneath Mezzanine walkway. Do not impede egress from Attic.
  - 3. Install to enable drainage of system.
    - a. Install main drain from riser according to NFPA 13, paragraph 8.17.4.
  - 4. Install piping system, except for dry heads, so it will not be exposed to freezing temperatures.
  - 5. Do not use dropped, damaged, or used sprinkler heads.
  - 6. Install tamper switches and flow detectors where located by Architect.
  - 7. Except for Siamese connection, install automatic ball drip device in lowest point of piping to fire department connection and drain to floor drain or to exterior of building.
  - 8. Brace and support system to meet seismic zone requirements for building site.
- C. Flush underground piping at full design flow rate for minimum five minutes. Route water to outside of building. Protect landscaping and other exterior elements from damage during flow tests.

#### 3.4 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Pressure Test:
    - a. Hydrostatically test system to 200 psi minimum for 2 hours as required by 'Contractor's Material And Testing certificate for Above Ground Piping' NFPA-13, Figure 25.1 (2013) Edition).
  - 2. Water Flow Test:
    - a. Test to determine static and residual pressures and corresponding flow rate at point of connection to utility water main
    - b. Adjust water flow test data for seasonal fluctuations and future growth as recommended by Water Utility and
    - c. At point of connection to utility water main, combine inside and outside hose stream allowances.
  - 3. Check piping in relation to insulation envelope to be certain piping and auxiliary drains are properly enclosed inside building insulation envelope. Report unsatisfactory conditions to Architect.
  - 4. Tests shall be witnessed by Architect and representative of local jurisdiction over fire prevention.

## 3.5 CLEANING

- A. Installation of piping:
  - 1. Store all pipe, fittings, valves, accessories, etc. in a manner that they will not be damaged or present a tripping hazard to others working on the project.
    - Locate equipment storage where directed by the General Contractor such that it not impede access to any
      portion of the building for other trades or crafts.
  - 2. Protect concrete floor from oil spillage where pipe threading machine is located.
  - 3. After installation of system leave work area broom clean.

# 3.6 CLOSE-OUT ACTIVITIES

- A. Instruction of Owner:
  - 1. Instruction Sessions:
    - a. Instruct Owner's personnel in operation and maintenance of system utilizing 'Operation and Maintenance Manual' when so doing. Minimum instruction period shall be four (4) hours.
      - 1) Include antifreeze system requirement to be tested at least once a year.
    - b. Instruction sessions shall occur after Substantial Completion inspection when system is properly working and before final payment is made.
    - c. Provide Owner with latest version of NFPA 25.
- B. Training:

- 1. Installer required to provide FM Training from latest version of NFPA 25 with checklist and brief explanation of following inspections:
  a. Weekly Inspection.
  - a.
  - Monthly Inspection. b.
  - Quarterly Inspection. C.
  - Semi-Annual Inspection. d.
  - Annual Inspection. e.

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# DIVISION 22 - PLUMBING:

22	0000	Plumbing
	22 0501	Common Plumbing Requirements
	22 0529	Hangers and Supports for Plumbing Piping and Equipment
	22 0553	Identification for Plumbing Pipes and Equipment
	22 0719	Plumbing Piping Insulation
22	1000	Plumbing Pipes and Pumps
	22 1116	Domestic Water Piping
	22 1119	Domestic Water Piping Specialties
	22 1313	Facility Sewers
	22 1319	Facility Sanitary Sewer Specialties
22	3000	Plumbing Equipment
	22 3413	Instantaneous, Tankless, Gas Domestic Water Heaters
	22 3423	Gas Domestic Water Heaters
22	4000	Plumbing Fixtures
	22 4213	Commercial Water Closets and Urinals
	22 4216	Commercial Lavatories and Sinks
	22 4240	Font Faucets, Supplies, and Trim
	22 4700	Drinking Fountains and Water Coolers

DIVISION 22 PLUMBING

# SECTION 22 0501 COMMON PLUMBING REQUIREMENTS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for plumbing systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Furnish and install sealants relating to installation of systems installed under this Division.
  - 4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.
- C. Related Requirements:
  - Section 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
  - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 3. Section 07 8400: 'Firestopping' for quality of penetration firestop systems to be used on Project and submittal requirements.
  - 4. Section 07 9213: 'Elastomeric Joint Sealant' for quality at building exterior.
  - 5. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of plumbing items requiring field painting.
  - 6. Section 22 0548: 'Vibration And Seismic Control for Plumbing Piping and Equipment'.
  - 7. Division 26: 'Electrical' for raceway and conduit, unless specified otherwise, and line voltage wiring.
  - 8. Division 33: 'Utilities' for piped utilities.
  - Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

# 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data
        of each manufactured item and enough information to show compliance with Contract Document
        requirements. Literature shall show capacities and size of equipment used and be marked indicating
        each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Plumbing Subcontractor:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
    - b. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
      - 1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:
        - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
        - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:

- (1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
- (2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.
- c) Provide operating instructions to include:
  - (1) General description of fire protection system.
  - (2) Step by step procedure to follow for shutting down system or putting system into operation.
- b. Warranty Documentation:
  - 1) Include copies of warranties required in individual Sections of Division 22.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  - In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract
    Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing
    work affected by such differences.
  - 3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Plumbing Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in plumbing installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  - 2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Accept valves on site in shipping containers with labeling in place.
  - 2. Provide temporary protective coating on cast iron and steel valves.
  - 3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage And Handling Requirements:
  - 1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
  - 2. Store items subject to moisture damage in dry, heated spaces.

# 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.
- B. Special Warranty:
  - 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  - 2. If plumbing sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

#### PART 2 - PRODUCTS

# 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  - 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
  - Use domestic made pipe and pipe fittings on Project, except non-domestic made cast iron pipe and fittings by MATCO-NORCA are acceptable.

## C. Sleeves:

- 1. General:
  - a. Two sizes larger than bare pipe or insulation on insulated pipe.
- 2. In Concrete And Masonry:
  - Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
- 3. In Framing And Suspended Floor Slabs:
  - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal.

#### D. Valves:

1. Valves of same type shall be of same manufacturer.

## PART 3 - EXECUTION

#### 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

# 3.2 EXAMINATION

## A. Drawings:

- 1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
- 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
- 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

#### B. Verification Of Conditions:

- 1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
- 2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
- 3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
- 4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

## 3.3 PREPARATION

- A. Changes Due To Equipment Selection:
  - 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
  - 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
  - 3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
  - 4. Be responsible for proper location of rough-in and connections provided under other Divisions.

# 3.4 INSTALLATION

- A. Interface With Other Work:
  - 1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
  - 2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
  - Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
  - Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
  - Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
  - 4. Determine exact route and location of each pipe before fabrication.
    - a. Right-Of-Wav:
      - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
      - Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
    - b. Offsets, Transitions, and Changes in Direction:
      - 1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
      - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

# D. Penetration Firestops:

1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.

## E. Sealants:

- 1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
- 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.
- F. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
  - 1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
  - 2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
    - a. Arrange so as to facilitate removal of tube bundles.
    - Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
      - 1) Make connections of dissimilar metals with di-electric unions.

- 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
- c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch in diameter and smaller.
- d. Install piping systems so they may be easily drained
- e. Install piping to insure noiseless circulation.
- f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
- 3. Do not install piping in shear walls.
- 4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
- 5. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
- 6. Make changes in direction with proper fittings.
- 7. Expansion of Thermoplastic Pipe:
  - a. Provide for expansion in every 30 feet of straight run.
  - b. Provide 12 inch offset below roof line in each vent line penetrating roof.

## G. Sleeves:

- 1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
- 2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants.
- 3. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
- 4. Sleeves through floors and foundation walls shall be watertight.

#### H. Escutcheons:

 Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

## 3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
  - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  - 2. Surface finishes shall exactly match existing finishes of same materials.

## 3.6 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
  - 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
  - 2. Repeat tests on new material, if requested.

# 3.7 CLEANING

- A. Remove dirt, grease, and other foreign matter from each length of piping before installation:
  - 1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
  - 2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
  - 3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

# 3.8 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
  - 1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
  - 2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

# 3.9 PROTECTION

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

# SECTION 22 0529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for plumbing systems.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Paint identification for gas piping used in HVAC equipment.
- C. Related Requirements:
  - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 5. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
  - 6. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

# 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Anvil International, Portsmouth, NH www.anvilintl.com.
    - b. Cooper B-Line, Highland, IL www.b-line.com.
    - c. Unistrut, Wayne, MI www.tyco-unistrut.com.
- B. Materials:
  - 1. Hangers, Rods, And Inserts
    - a. Galvanized and UL approved for service intended.
    - Support horizontal piping from hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
      - Support insulated pipes 2 inches in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.
        - a) Type Two Acceptable Products:
          - (1) Swivel Ring Hanger: Anvil Fig. 69.
          - (2) Insulation Protection Shield: Anvil Fig. 167.
          - (3) Equals by Cooper B-Line.
      - 2) Support insulated pipes 2-1/2 inches in diameter and larger with clevis hanger or roller assembly with an insulation protection shield. Gauge and length of shield shall be according to Anvil design data.
        - a) Type Two Acceptable Products:
          - (1) Clevis Hanger: Anvil Fig. 260.

- (2) Roller Assembly: Anvil Fig. 171.
- (3) Insulation Protection Shield: Anvil Fig. 167.
- (4) Equals by Cooper B-Line.
- 3) Support uninsulated copper pipe 2 inches in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.
  - a) Type Two Acceptable Products:
    - (1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
    - 2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
    - (3) Equals by Cooper B-Line.
- 4) Support uninsulated copper pipe 2-1/2 inches in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.
  - a) Type Two Acceptable Products:
    - (1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
    - (2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
    - (3) Equals by Cooper B-Line.
- c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size	
3/8 inch	2 inches and smaller	
1/2 inch	2-1/2 to 3-1/2 inches	
5/8 inch	4 to 5 inches	
3/4 inch	6 inches	
7/8 inch	8 to 12 inches	

d. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

R	ods	Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than 10,000 psi.
- e. Riser Clamps For Vertical Piping:
  - 1) Type Two Acceptable Products:
    - a) Anvil Fig. 261.
    - b) Equals by Cooper B-Line.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Piping:
  - 1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
    - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
    - b. Supports For Horizontal Piping:
      - 1) Support metal piping at 96 inches on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
      - 2) Support thermoplastic pipe at 48 inches on center maximum.
      - 3) Provide support at each elbow. Install additional support as required.
    - c. Supports for Vertical Piping:
      - 1) Place riser clamps at each floor or ceiling level.
      - Securely support clamps by structural members, which in turn are supported directly from building structure.
      - 3) Provide clamps as necessary to brace pipe to wall.
    - d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

- 2. Gas piping Identification:
  - a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

# SECTION 22 0553 IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Materials:
  - 1. Labels:
    - a. Equipment Identification:
      - 1) Black Formica, with white reveal when engraved.
      - 2) Lettering to be 3/16 inch high minimum.
  - 2. Paint:
    - a. One Coat Primer:
      - 1) 6-2 Quick Drying Latex Primer Sealer over fabric covers.
      - 2) 6-205 Metal Primer under dark color paint.
      - 3) 6-6 Metal Primer under light color paint.
    - b. Finish Coats: Two coats 53 Line Acrylic Enamel.
    - c. Performance Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA www.pittsburghpaints.com or PPG Canada Inc, Mississauga, ON (800) 263-4350 or (905) 238-6441.
    - d. Type Two Acceptable Products. See Section 01 6200.
      - Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
        - a) Benjamin Moore, Montvale, NJ www.benjaminmoore.com or Toronto, ON (800) 304-0304 or (416) 766-1176.
        - b) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON www.dulux.com.
        - c) Sherwin Williams, Cleveland, OH www.sherwin-williams.com.

# PART 3 - EXECUTION

## 3.1 APPLICATION

- A. Labels:
  - 1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
    - Water Heaters.
  - 2. Engrave following data from Equipment Schedules on Drawings onto labels:
    - a. Equipment mark.
    - b. Room(s) served.
    - c. Panel and breaker from which unit is powered.
- B. Painting:
  - 1. Only painted legends, directional arrows, and color bands are acceptable.
  - Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
    - a. Adjacent to each item of equipment.
    - b. At point of entry and exit where piping goes through wall.
    - c. On each riser and junction.
    - d. Every 25 feet on long continuous lines.

e. Stenciled symbols shall be one inch high and black.

# 3.2 ATTACHMENTS

- A. Schedules:
  - 1. Pipe Identification Schedule:
    - a. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CW
Domestic Hot Water	HW

# SECTION 22 0719 PLUMBING PIPING INSULATION

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 1116: 'Domestic Water Piping'.
  - 2. Section 22 1400: 'Facility Storm Drainage'.

#### PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armacell, Mebane, NC www.armaflex.com.
    - b. Childers Products Co, Eastlake, OH www.fosterproducts.com.
    - c. IMCOA, Youngsville, NC www.nomacokflex.com.
    - d. Johns-Manville, Denver, CO www.jm.com.
    - e. Knauf, Shelbyville, IN www.knauffiberglass.com.
    - f. Manson, Brossard, PQ, Canada www.isolationmanson.com.
    - g. Nomaco Inc, Yopungsville, NC www.nomacokflex.com.
    - h. Owens-Corning, Toledo, OH www.owenscorning.com.
    - i. Speedline Corp, Solon, OH www.speedlinepvc.com.

#### B. Materials:

- 1. Above Grade Metal Piping:
  - a. Insulation For Piping:
    - Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
    - 2) Insulation Thickness:

modiation información					
Service Water Temperature	Pipe Sizes				
	Up to 1-1/4 In :	1-1/2 to 2 In Ov	ver 2 In		
170 - 180 Deg F	One In	1-1/2 In	2 In		
140 - 160 Deg F	1/2 In	One In	1-1/2 In		
45 - 130 Deg F	1/2 In	1/2 In	One In		

- 3) Performance Standards: Fiberglas ASJ by Owens-Corning.
- 4) Type One Acceptable Manufacturers:
  - a) Childers Products.
  - b) Knauf.
  - c) Manson.
  - d) Owens-Corning.
  - e) Johns-Manville.
  - f) Equal as approved by Architect before bidding. See Section 01 6200.
- b. Fitting, Valve, And Accessory Covers:
  - 1) PVC.
  - 2) Performance Standard: Zeston by Johns-Manville.
  - 3) Type One Acceptable Manufacturers:
    - a) Knauf.
    - b) Speedline.

- c) Johns-Manville.
- d) Equal as approved by Architect before bidding. See Section 01 6200.
- 2. Below Grade Metal Piping:
  - a. Insulation:
    - 1) 1/2 inch thick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - ) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
- 3. PP-R Hot Water Piping, Above And Below Grade:
  - a. Insulation:
    - 1) 1/2 inch thick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.

# 3.1 APPLICATION

- A. Above Grade Piping:
  - 1. Apply insulation to clean, dry piping with joints tightly butted.
  - 2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
  - 3. Piping up to 1-1/4 inch Diameter:
    - Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
    - b. Adhere 3 inch wide self-sealing butt joint strips over end joints.
  - 4. Piping 1-1/2 inches Diameter And Larger:
    - a. Use broken-joint construction in application of two-layer covering.
    - b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.
      - 1) Apply by hand in several layers to make up total specified thickness.
      - 2) Final layer shall have smooth uniform finish before application of covering.
  - 5. Fittings, Valves, And Accessories:
    - a. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
    - b. Piping Up To 1-1/4 Inch Diameter:
      - Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
      - 2) Alternate Method:
        - a) Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.
    - c. Piping 1-1/2 inches To 2 Inches:
      - Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
      - 2) Apply final coat of fitting mastic over insulating cement.
    - d. Piping 2-1/2 inch And Larger:
      - Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement.
      - 2) Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.

- 6. Pipe Hangers:
  - a. Do not allow pipes to come in contact with hangers.
  - b. Pipe Shield:
    - 1) Provide schedule 40 PVC by 6 inch long at each clevis and/or unistrut type hanger.
    - 2) Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
    - 3) Provide 22 ga by 6 inch long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.
  - c. At Pipe Hangers:
    - Provide rigid calcium silicate insulation (100 psi compressive strength) at least 2 inches beyond shield.
- Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum
  cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on
  surrounding insulation.
- B. Below Grade Piping:
  - 1. Slip underground pipe insulation onto pipe and seal butt joints.
  - 2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

# SECTION 22 1116 DOMESTIC WATER PIPING

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavating and backfilling required by work of this Section.
  - 2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 03 3111: 'Normal Weight Structural Concrete'.
    - a. Pre-installation conference held jointly with other concrete related sections.
  - 2. Section 22 0501: 'Common Piping Requirements'.
  - 3. Section 22 0719: 'Plumbing Piping Insulation'.
  - 4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 5. Section 31 2323: 'Fill' for criteria for performance of backfill.
  - 6. Section 33 1116: 'Site Water Utility Distribution Piping' for domestic water piping from 5 feet from building perimeter to main.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American National Standards Institute / American Society of Sanitary Engineers:
    - a. ANSI/ASSE 1017-2009, 'Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems'.
    - b. ANSI/ASSE 1070-2004, 'Performance Requirements for Water Temperature Limiting Devices'.
  - 2. ASTM International:
    - a. ASTM B88-09, 'Standard Specification for Seamless Copper Water Tube'.
    - b. ASTM E84-13a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - 3. NSF International Standard:
    - a. NSF P171, 'Protocol for Chlorine Resistance of Plastic Piping Materials' (1999).
  - 1. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 14-2013, 'Plastic Piping System Components and Related Materials'.
    - b. NSF/ANSI 61-2012, 'Drinking Water System Components Health Effects'.
    - c. NSF/ANSI 372-2011, 'Drinking Water System Components Lead Content'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Qualifications:
  - 1. Manufacturer Qualifications:
    - a. PP-R pipe:
      - 1) Certified by NSF International.
  - 2. Installers Qualifications:
    - a. PP-R pipe:
      - 1) Certified by Manufacturer.
- B. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:

a. Written report of sterilization test.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.
  - 2. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free.

## PART 2 - PRODUCTS

#### 2.1 SYSTEMS

#### A. Manufacturers:

- Manufacturer Contact List:
  - a. Aquatherm, Inc., Lindon, UT www.aquathermpipe.com.
  - b. Cash Acme, Cullman, AL www.cashacme.com
  - c. Cla-Val Company, Costa Mesa, CA or Cla-Val Canada Ltd, Beamsville, ON www.cla-val.com.
  - d. Conbraco Industries Inc, Matthews, NC www.conbraco.com or Conbraco (Honeywell Ltd), Scarborough, ON (416) 293-8111.
  - e. Hammond Valve, New Berlin, WI www.hammondvalve.com.
  - f. Handy & Harmon Products Div, Fairfield, CT www.handyharmon.com or Handy and Harmon of Canada Ltd, Rexdale, ON (800) 463-1465 or (416) 675-1860.
  - g. Harris Products Group, Cincinnati, OH www.harrisproductsgroup.com.
  - h. Honeywell Inc, Minneapolis, MN www.honeywell.com.
  - i. Leonard Valve Co, Cranston, RI www.leonardvalve.com.
  - j. Milwaukee Valve Co, New Berlin, WI www.milwaukeevalve.com.
  - k. Nibco Inc, Elkhart, IN www.nibco.com.
  - I. Rehau. Leesburg. VA www.rehau-na.com.
  - m. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
  - n. Spence Engineering Co, Walden, NY www.spenceengineering.com.
  - o. Symmons Industries, Braintree, MA www.symmons.com.
  - p. Uponor Inc, Apple Valley, MN www.uponor-usa.com.
  - q. Viega ProPress, Wichita, KS www.viega-na.com.
  - r. Watts Regulator Co, Andover, MA www.wattsreg.com.
  - s. Wilkins (Zurn Wilkins), Paso Robles, CA www.zurn.com.
  - t. Zurn PEX, Inc., Commerce, TX www.zurnpex.com.

#### B. Materials:

- Design Criteria:
  - a. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
  - b. No CPVC allowed.
- 2. Pipe:
  - a. Copper:
    - 1) Above-Grade:
      - a) Meet requirements of ASTM B88, Type L.
    - 2) Below-Grade:
      - a) Meet requirements of ASTM B88, Type K. 3/4 inch minimum under slabs.
      - b) 2 inches And Smaller: Annealed soft drawn.
      - c) 2-1/2 inches And Larger: Hard Drawn.
  - o. Polypropylene-Random (PP-R):
    - 1) Above-Grade:
      - Meet requirements of ASTM F2389 and be certified by NSF International per ASTM F2389, NSF/ANSI 14, and NSF/ANSI 61.
      - SDR 7.4 Greenpipe faser for domestic hot water and SDR 7.4 or SDR 11 greenpipe for domestic cold water. Aquatherm Lilac SDR 11 purple piping for recycled/reclaimed water systems.
    - 2) Below-Grade:

- Meet requirements of ASTM F2389 and be certified by NSF International per ASTM F2389, NSF/ANSI 14, and NSF/ANSI 61.
- b) SDR 7.4 Greenpipe faser for domestic hot water and SDR 7.4 or SDR 11 greenpipe for domestic cold water. Aquatherm Lilac SDR 11 purple piping for recycled/reclaimed water systems.
- 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - Aquatherm Greenpipe, Greenpipe faser, and Lilac by Aquatherm.
- 3. Fittings:
  - a. For Copper Pipe: Wrought copper.
  - b. For PP-R Pipe:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Greenpipe by Aquatherm.
- 4. Connections For Copper Pipe:
  - a. Above-Grade:
    - Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
    - 2) Viega ProPress System
  - b. Below Grade:
    - 1) Brazed using following type rods:
      - a) Copper to Copper Connections:
        - (1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
        - (2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).
    - 2) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
    - 3) Do not use rods containing Cadmium.
    - 4) Brazing Flux:
      - a) Approved Products:
        - (1) Stay-Silv white brazing flux by Harris Product Group.
        - (2) High quality silver solder flux by Handy & Harmon.
    - 5) Joints under slabs acceptable only if allowed by local codes.
- 5. Connections For PP-R Pipe:
  - a. Above-Grade:
    - 1) Socket-fusion, fusion-outlet, electrofusion, buttwelding, and mechanical transition fittings including threaded adapters, groove adapters, and flanges.
  - b. Below-Grade:
    - All joints shall be fusion-welded PP-R except that flanges may be used when connecting to other piping systems. Mechanical fittings shall not be used below grade.
    - 2) Joints under slabs acceptable only if allowed by local codes.
- 6. Ball Valves:
  - a. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
  - b. Valves shall be two-piece, full port for 150 psi SWP.
    - 1) Operate with flow in either direction, suitable for throttling and tight shut-off.
    - 2) Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
    - 3) Seat: Bubble tight at 100 psig under water.
  - c. Class One Quality Standard: Nibco T585 or S585.
    - 1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.
  - d. PP-R piping if used:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) PP-R fusion-weld ball valves by Aquatherm.
- 7. Combination Pressure Reducing Valve / Strainer:
  - a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
  - b. Built-in thermal expansion bypass check valve.
  - c. Class One Quality Standard: Watts LFU5B:
    - 1) Equal by Cash Acme, Cla-Val Hi Capacity, Conbraco 36C, Honeywell-Braukmann, Spence Hi Capacity, Watts, or Wilkins. See Section 01 6200.
- 8. Mixing Valve MV-1 and MV-2:
  - a. Solid brass construction and CSA B125 certified.
  - b. Includes integral check valves and inlet screen. Features advanced paraffin-based actuation technology.
  - c. Flow of 5.7 GPM with maximum 10 psi pressure drop. Perform to minimum flow of 0.5 GPM in accordance with ASSE 1017.
  - d. Set for 110 deg F Service.
  - e. Match Construction Drawings for connection sizes.
  - f. Class One Quality Standard: Powers LFLM495. See Section 01 6200.
  - g. Acceptable Manufacturers: Lawler, Leonard, Powers, Sloan, Symmons, and Watts.

- 9. Mixing Valve MV-3:
  - a. Solid brass construction and CSA B125 certified.
  - b. Includes integral check valves and inlet screen. Features advanced paraffin-based actuation technology.
  - c. Flow of 11 GPM with maximum 10 psi pressure drop. Perform to minimum flow of 0.5 GPM in accordance with ASSE 1017.
  - d. Set for 110 deg F Service.
  - e. Match Construction Drawings for connection sizes.
  - f. Class One Quality Standard: Powers LFMM431. See Section 01 6200.
  - g. Acceptable Manufacturers: Lawler, Leonard, Powers, Sloan, Symmons, and Watts.

#### 3.1 INSTALLATION

A. Locate cold water lines a minimum of 6 inches from hot water line.

#### 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
  - Before pipes are covered, test systems in presence of Architect/Engineer at 125 psig hydrostatic pressure for four (4) hours and show no leaks.
  - 2. Disconnect equipment not suitable for 125 psig pressure from piping system during test period.
  - 3. PP-R Piping:
    - a. Test in accordance with Manufacturer's instructions prior to covering.
      - 1) Provide documentation.

#### 3.3 CLEANING

- A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect/Engineer. Allow sterilization solution to remain for twenty four (24) hours and open and close valves and faucets several times during that time.
- B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
- C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

# SECTION 22 1119 DOMESTIC WATER PIPING SPECIALTIES

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components Lead Content'.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

## PART 2 - PRODUCTS

## 2.1 ACCESSORIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Ashcroft, Stratford, CT www.ashcroftinc.com.
    - b. H O Trerice, Oak Park, MI www.hotco.com.
    - c. IPS Corporation, Compton, CA www.ipscorp.com.
    - d. Josam Co, Michigan City, IN www.josam.com.
    - e. Jay R. Smith Maufacturing Co, Montgomery, AL www.jrsmith.com.
    - f. Prier Products, Inc., Grandview, MD www.prier.com.
    - g. Proset Systems Inc., Lawrenceville, GA www.prosetsystems.com.
    - h. Sioux Chief Manufacturing Co, Peculiar, MO www.siouxchief.com.
    - i. Sure Seal, Tacoma, WA www.thesureseal.com.
    - j. Wade (Division of Tyler Pipe), Tyler, TX www.wadedrains.com.
    - Watts Drainage, Spindale, NC www.watts.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
    - I. Weiss Instruments, Inc., Holtsville, NY www.weissinstruments.com.
    - m. Woodford Manufacturing, Colorado Springs, CO www.woodfordmfg.com.
    - n. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON www.zurn.com.

#### B. Materials:

- 1. Trap Guard Trap Seal:
  - a. Design Criteria:
    - 1) Not required to meet NSF International Standards for Lead Free.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Trap Guard by Proset:

- a) Install per Manufacturer's recommendations.
- 2) Sure Seal by Sure Seal:
  - a) Install per Manufacturer's recommendation.
- 2. Pressure Reducing Station:
  - a. Design Criteria:
    - 1) Meet NSF International Standards for Lead Free.
  - b. Pressure Gauges:
    - 1) Gauges shall have following features:
      - a) Cast aluminum case.
      - b) Chrome plated ring.
      - c) Impact resistant window.
      - d) Phosphor bronze alloy steel bourdon tube.
      - e) 1/2 percent scale range accuracy.
      - f) 4-1/2 inch diameter dial face.
      - g) Range 0 to 100 psig.
    - 2) Class One Quality Standard: 500X by H O Trerice.
      - a) Equal by Ashcroft or Weiss. See Section 01 6200.
  - c. Brass Gauge Cocks:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) 1092 by Ashcroft.
      - b) 865 by H O Trerice.
- 3. Exterior Hydrants:
  - a. Design Criteria:
    - 1) Provide with integral anti-siphon device. Key-operated.
    - 2) Non-freeze.
    - 3) Not required to meet NSF International Standards for Lead Free.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Josam: 71050.
    - 2) Jay R. Smith: 5609-QT.
    - 3) Prier: C-634.
    - 4) Wade: W-8600.
    - 5) Watts: HY-725.
    - 6) Woodford: 67.
    - 7) Zurn: Z-1310.
- 4. Water Hammer Arrestors:
  - a. Design Criteria:
    - 1) Meet NSF International Standards for Lead Free.
    - 2) Nesting type, air pre-charged bellows with casing.
    - 3) Bellows constructed of stabilized 18-8 stainless steel.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Josam: 75003.
    - 2) Jay R. Smith: 5020.
    - 3) Sioux Chief: 650 Series.
    - 4) Wade: 20.

#### 3.1 INSTALLATION

A. Gauges: Connect to pipe with 1/4 inch connections utilizing gauge cocks.

# SECTION 22 1313 FACILITY SANITARY SEWERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
  - 2. Perform excavation and backfill required by work of this Section.
- B. Related Requirements:
  - 1. Sections Under 07 3000 Heading: Furnishing and installing of roof jacks and pipe flashing at roof.
  - 2. Section 07 8400: 'Firestopping' for quality of firestopping material.
  - 3. Section 22 0501: 'Common Plumbing Requirements'.
  - 4. Section 22 1319: 'Facility Sanitary Sewer Specialties' for furnishing of sewer specialties.
  - 5. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 6. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.
  - 7. Section 33 3313: 'Sanitary Utility Sewerage' for sewage piping from 5 feet out from building to main.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 03 3111.

#### 1.3 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
    - b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - ASTM D3034–14, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - d. ASTM F656–15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
    - e. ASTM F891–10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.
  - 2. International Code Council:
    - a. ICC IPC-2015, 'International Plumbing Code'.

# PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Performance:
  - 1 Design Criteria
    - a. Minimum size of waste piping installed under floor slab on grade shall be 2 inches.
- B. Materials:
  - Piping And Fittings: PVC Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
    - a. Furnish wall cleanouts with chrome wall cover and screw.

- 2. Fittings:
  - P-Traps: a.
    - Trap shall have clean out plug if installed in other than slab on grade. 1)
    - Type Two Acceptable Products. 2)
      - JR Smith: 7220 deep seal cast iron.
      - Mifab: MI-950. b)
      - Zurn: Zurn Z-1000. c)
      - d) Equal as approved by Architect before installation. See Section 01 6200.
- 3. Cleanouts:
  - Furnish wall cleanouts with chrome wall cover and screw.
  - Type Two Acceptable Products:
    - Finish Floors:
      - Josam: 56010. a)
      - b) J. R. Smith: 4023.
      - Mifab: C1100C-R-1. c)
      - d) Wade: W-6000.
      - Watts: CO-200-R. e)
      - Zurn: Z-1402. f)
    - Resilient Flooring: 2)
      - Josam: 56010-12. a)
      - J. R. Smith: 4140. b)
      - c) Mifab: C1100C-T-1.
      - Wade: W-6000-T. d)
      - Watts: CO-200-T. e)
      - Zurn: Z-1400.
      - Finished Wall:

3)

- Josam: 58790. a)
- J. R. Smith: 4530. b)
- c) Mifab: C1460RD.
- Wade: W8560E. d)
- Watts: CO-460-RD. e)
- Zurn: Z-1446. f)
- **Exposed Drain Lines:** 4)
  - a) Josam: 58910.
  - J. R. Smith: 4510. b)
  - Mifab: C1460. c)
  - Wade: W8560B. d)
  - Watts: CO-460. e)
  - Zurn: Z-1440. f)
- General Purpose: 5)
  - Josam: 58900.
  - J. R. Smith: 4400. b)
  - c) Mifab: C1300-MF
  - Wade: W8550E. d)
  - Watts: CO-380. e)
  - Zurn: Z-1440.
- Equal as approved by Architect before installation. See Section 01 6200.

#### PART 3 - EXECUTION

#### 3.1 **INSTALLATION**

- Excavate and backfill as specified in Sections 31 2316 and 31 2323 with following additional requirements:
  - Runs shall be as close as possible to those shown on Drawings.
  - Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter 1/4 inch fall in one foot in direction of flow.
  - 3. Bottom of trenches shall be hard. Tamp as required.
  - 4. Remove debris from trench before laying of pipe.
  - Do not cut trenches near footings without consulting Architect.

- B. Thermoplastic Pipe And Fittings:
  - 1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
  - 2. Above Grade: Locate pipe hangers every 4 feet on center maximum and at elbows.
  - Below Grade:
    - a. Install in accordance with Manufacturer's recommendations and ASTM D2321.
    - b. Stabilize unstable trench bottoms.
    - c. Bed pipe true to line and grade with continuous support from firm base.
      - 1) Bedding depth: 4 to 6 inches.
      - 2) Material and compaction to meet ASTM standard noted above.
    - d. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
    - e. Trench width at top of pipe:
      - 1) Minimum: 18 inches or diameter of pipe plus 12 inches, whichever is greater.
      - 2) Maximum: Outside diameter of pipe plus 24 inches.
    - f. Do not use backhoe or power equipment to assemble pipe.
    - g. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
    - h. Minimum cover over top of pipe not under building slab:
      - 1) 36 inches before wheel loading.
      - 2) 48 inches before compaction.
- C. Install piping so cleanouts may be installed as follows:
  - 1. At every 135 degrees of accumulative change in direction for horizontal lines.
  - 2. Every 100 feet of horizontal run.
  - 3. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.
- D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or siphon condition on water seal.
- E. Vent entire waste system to atmosphere. Join lines together in fewest practicable numbers before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:
  - 1. 6 inches minimum above roof and 12 inches minimum from any vertical surface.
  - 2. Same size as vent pipe.
  - 3. In areas where minimum design temperature is below 0 deg F or where frost or snow closure may be possible:
    - a. Vent line terminations shall be same size as vent pipe, except no smaller than 2 inches in diameter.
    - b. Vents shall terminate 10 inches minimum above roof or higher if required by local codes.
- F. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07 8400 and 22 0501
- G. If test Tees are used for testing, plug Tees so wall finish can be installed. Do not leave as exposed cleanouts.

# 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Conduct tests for leaks and defective work. Notify Architect before testing.
  - 2. Thermoplastic Pipe System:
    - a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or 10 feet minimum, and show no leaks for two hours. Correct leaks and defective work.
    - After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

# SECTION 22 1319 FACILITY SANITARY SEWER SPECIALTIES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under this Section as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 3013: 'Ceramic Tile' for floor drains in ceramic tile floors.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1119: 'Domestic Water Piping Specialties'.
  - 4. Section 22 1313: 'Facility Sanitary Sewers' for installation of miscellaneous sanitary sewer specialties.

#### PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Josam Co, Michigan City, IN www.josam.com.
    - b. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
    - c. Mifab Manufacturing Inc, Chicago, IL www.mifab.com.
    - d. Proset Systems, Lawrenceville, GA www.prosetsystems.com.
    - e. Sioux Chief Manufacturing Co, Peculiar, MO www.siouxchief.com.
    - f. Sureseal Manufacturing, Tacoma WA www.thesureseal.com.
      - 1) Contact Information:
        - a) All Areas except Idaho and Utah: Rick Ensley (253) 564-0624, rick@thesureseal.com.
        - o) Idaho and Utah Areas: Mark Evans, phone (801) 748-1222, mark@franklinjames.com.
    - g. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
    - h. Watts Drainage, Spindale, NC www.watts.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
    - i. Zurn Industries, LLC, Erie PA www.zurn.com. or Zurn Industries Ltd, Mississuaga, ON (905) 795-8844.

#### B. Performance:

- 1. Design Criteria:
  - a. All materials NOT required to be low lead compliant.
- C. Components:
  - 1. Drains And Drain Accessories:
    - a. Floor Drain FD-1:
      - 1) Approved types with deep seal trap and chrome plated strainer.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Josam: 30000-50-Z-5A.
        - b) J. R. Smith: 2010-A.
        - c) Mifab: F-1100-C.
        - d) Sioux Chief: 832.
        - e) Wade: 1100.
        - f) Watts: FD-200-A.
        - g) Zurn: Z-415.

#### D. Accessories:

- 1. Drain Accessories:
  - a. Condensate Receptor:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Trap seal by Sureseal. Provide model number to match floor drain.

- b. Floor Drains:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - Trap guard by Proset Systems. Provide model number to match floor drain.
    - Trap seal by Sureseal. Provide model number to match floor drain.

PART 3 - EXECUTION: Not Used

# SECTION 22 3413 INSTANTANEOUS, TANKLESS, GAS DOMESTIC WATER HEATERS

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install gas-fired tankless water heaters as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 4543: 'Font Water Adjusting & Balancing'.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.
  - 4. Section 23 1123: 'Facility Natural Gas Piping'.
  - 5. Section 23 5135: 'Air Piping'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'
    - ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - d. ASTM D2665-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.
  - 2. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components Lead Content'.

## 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance and operational instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Direct Vent Water Heater:
    - a. 10 year factory warranty on heat exchanger and 3 years on other parts.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Design Criteria:
  - All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
- B. Direct Vent
  - 1. Include vent package and direct vent termination kit for complete vent installation.
  - 2. All domestic water wetted components must be Lead Free and certified to NSF Lead Free standards.
  - 3. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - a. Meetinghouse with Font:
      - 1) Model RTC-199 by HTP, Inc., New Bedford, MA www.htproducts.com.
        - a) Attn: Michael Lundquist 801-487-5700 Michael Lundquist ml@lundquistsales.com.
      - 2) NPE 240A(Pb) by Navien, Irvine CA, www.NavienAmerica.com.
      - 3) Model NCC-1991-DV or NCC1992-DV by Noritz, distributed by Franklin James Company, Sandy, UT. a) Attn: Mark Evans, cell (801) 558-3142 mark@franklinjames.com.
      - 4) Model ODW-199A by Quietside Corporporation, Carlisle, PA www.quietside.com.
      - 5) Model RU98i (REU-KB3237FFUD-US) by Rinnai-MJM Associates Inc, Herriman, UT Attn: Colin Schmidt www.foreverhotwater.com.
      - 6) Model T-H3-DV by Takagi, Irvine, CA www.takagi.com.

## 2.2 ACCESSORIES

- A. PVC Flue Piping (Instantaneous Tankless Water Heaters):
  - 1. Manufacturer Contact List:
    - a. Armaflex by Armacell, Mebane, NC www.armaflex.com.
    - b. Nomaco, Youngsville, NC www.nomacokflex.com.
  - 2. Flue:
    - Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
    - b. Piping Primer And Cement.
      - a) Meet requirements of ASTM D2564.
    - c. Flexible Foamed Pipe Insulation:
      - 1) Thickness:
        - a) 1/2 inch for 2 through 3 inch outside diameter pipe.
        - b) 1/2 inch sheet for fittings as recommended by Manufacturer.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Tubolit by Armaflex.
        - b) ImcoLock or Therma-Cel by Nomaco K-Flex.
    - d. Insulation Joint Sealer:
- B. Stainless Steel Flues (Instantaneous Tankless Water Heaters):
  - 1. Manufacturer Contact List:
    - a. Double wall, factory-fabricated Category III type.
      - 1) Armaflex by Armacell, Mebane, NC www.armaflex.com.
      - 2) Nomaco, Youngsville, NC www.nomacokflex.com.
  - Flue:
    - a. Design Criteria:
      - 1) Double wall, factory-fabricated Category III type.
      - 2) AL-29-4C stainless steel inner conduit and Type 430 stainless steel outer jacket.
      - 3) Inspection cap, condensate drain, and roof flashing. Provide horizontal, vertical, and roof support.

- 4) Seal joints as recommended by Flue Manufacturer.
- b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Saf-T Vent C1 by Heat-Fab.
  - 2) Fasnseal W2 by Protech Systems.
  - 3) Z-Vent III by Z-Flex (US).

#### 3.1 INSTALLATION

- A. Water Heaters:
  - 1. Water heaters shall each have relief valve sized to match heat input and set to relieve at 120 psi.
  - Install temperature-pressure relief valve on hot water heater and pipe discharge directly above funnel of floor drain
  - 3. Provide mixing valve at all water heater installations as specified in Section 22 1116.

#### B. Vent:

- 1. Vent package and direct vent termination to be installed per Manufacturer's recommendations.
- 2. PVC Flue Piping:
  - a. General:
    - Run individual vent and individual combustion intake piping from each water heater to roof termination as recommended by Water Heater Manufacturer. Concentric roof termination kit may be used if approved by and provided by Water Heater Manufacturer. Slope lines downward toward water heater.
    - 2) Slope combustion chamber exhaust drain downward to floor drain.
  - b. Support:
    - Support concentric roof termination kit at ceiling or roof line with 20 ga sheet metal straps as detailed on Drawings.
    - Support horizontal sections of pipe in accordance with requirements of Section 23 0501. Anchor securely to structure, not allowing pipe to sway.
  - c. Insulation:
    - 1) General:
      - Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
      - Slip insulation on piping before piping sections and fittings are assembled keeping slitting of insulation to a minimum.
      - c) Joints:
        - (1) Place 'slit' joint seams of insulation exposed outside building on bottom of pipe.
        - (2) Stagger joints on layered insulation.
        - (3) Seal joints in insulation.
      - d) Paint exterior exposed insulation with two coats of finish recommended by Insulation Manufacturer, color selected by Architect.

# 3.2 ADJUSTING

A. Adjust gas input pressure to be between 6 and 7 inches of water column at regulator inlet. Adjust burner manifold pressure to 4.3 inches of water column on down stream side of gas regulator.

# SECTION 22 3423 GAS DOMESTIC WATER HEATERS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install gas-fired storage type water heater as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping'.
  - 3. Section 23 5134: 'Flues'.
  - 4. Section 23 5135: 'Air Piping'.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. CSA Group / American National Standards Institute:
    - a. CSA ANSI Z21.22-99(R08)/CSA 4.4-M99(R08), 'Relief Valves for Hot Water Supply Systems'.
  - 2. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components Lead Content'.

#### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance and operational instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Seismic Anchoring System:
    - a. Required for Seismic Design Category (SDC) C, D, E, or F or where authority having jurisdiction (AHJ) requires seismic protection use for water heater seismic anchoring systems.
    - b. Seismic Design Category (SDC) shall be determined by Project Structural Engineer.
  - 2. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Five-year on tank and one-year for parts.

#### PART 2 - PRODUCTS

# 2.1 EQUIPMENT

#### A. Manufacturers:

- Manufacturer Contact List:
  - a. LoAmerican Water Heater Co, Johnson City, TN www.americanwaterheater.com.
  - b. A O Smith Water Products Co, Ashland City, TN www.hotwater.com or A O Smith Enterprise Ltd, Stratford, ON (800) 265-8520 or (519) 271-5800.
  - c. Bradford White Corp, Ambler, PA www.bradfordwhite.com.
  - d. Heat Transfer Products, East Freetown, MA www.htproducts.com.
  - e. Lochinvar, Lebanon, TN www.lochinvar.com.
  - f. Rheem Water Heating, Montomery, AL www.rheem.com.
  - g. State Industries Inc, Ashland City, TN www.stateind.com.

#### B. Materials:

- 1. Design Criteria:
  - a. All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
- 2. Condensing Type Water Heaters:
  - a. Stainless steel or 90/10 cupronickel heat exchanger, pressure tested and rated for 150 psi w.p. complete with thermostat, high limit control, gas pressure regulator, 100 percent safety shutoff and powered combustion air blower. AGA and CGA approved.
  - b. 94 percent thermal efficiency.
  - c. Temperature and pressure relief valve sized to match heat input and set to relieve at 120 psi.
  - d. Vacuum relief valve meeting requirements of CSA ANSI Z21.22.
  - e. 34 55 Gallon:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - a) Polaris Model PGC3 34-130-2NV by American.
      - b) Polaris PGC3 50-130-3NV by American.
      - c) Cyclone BTX-100 by A. O. Smith.
      - d) EF-60T-125E-3N by Bradford White.
      - e) Phoenix PH100-55 by Heat Transfer Products.
      - f) SNR126-065 by Lochinvan.
      - g) HE45-100 by Rheem.
      - h) Force 90+ SHE50 100NE by State Industries.

## 2.2 ACCESSORIES

- A. Anchoring Components:
  - 1. One inch by 18 ga galvanized steel straps.
  - 2. No. 10 by 2-1/2 inch screws.
- B. Thermal Expansion Absorbers:
  - 1. Bladder type for use with potable water systems.
  - 2. Type One Acceptable Products:
    - a. Therm-X-Trol ST-12 by Amtrol Inc, West Warwick, RI www.amtrol.com.
    - b. Equal as approved by Architect before bidding. See Section 01 6200.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above funnel of floor drain.
- B. Anchor water heaters to wall using two anchoring straps and specified screws.
  - 1. Anchors shall be installed with one on vertical upper 1/3 and one on lower 1/3 of water heater.

C. Seismic Anchoring Systems shall be installed following Manufacturers requirements to California certifications or for minimum requirement, use Lag Bolts into studs.

# 3.2 ADJUSTING

A. Set discharge water temperature at 140 deg F or as indicated on Contract Drawings.

# SECTION 22 4213 COMMERCIAL WATER CLOSETS AND URINALS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. High-Efficiency Toilet (HET): Toilets with effective flush volume of 1.28 gallons or less.
  - 2. Maximum Performance (MaP): Toilet testing that rates toilet efficiency and flush performance by measuring number of grams of solid waste (soybean paste and toilet paper) that a toilet can flush and remove completely from fixture in single flush represented as a scale or score. 1000 grams is highest score possible (www.maptesting.com).
- B. Reference Standards:
  - 1. American Society of Mechanical Engineers / CSA Group (Canadian Standards Association):
    - a. ASME A112.19.2-2013/CSA B45.1-13, 'Ceramic Plumbing Fixtures'.

### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operation and Maintenance Data:
      - 1) Sensor Operated operation and maintenance manuals.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. American Standard Brands, Piscataway, NJ www.americanstandard-us.com or American Standard Canada, Mississauga, ON www.americanstandard.ca.
    - b. AMTC Advanced Modern Technologies Corp, Woodland Hills, CA www.amtcorporation.com.
    - c. Bemis Manufacturing Co, Sheboygan Falls, WI www.bemismfg.com.
    - d. Beneke by Sanderson Plumbing Products, Columbus, MS www.sppi.com.
    - e. Church Seat Co, Sheboygan Falls WI www.churchseats.com.
    - f. Delany Flush Valves, Charlottesville, VA www.delanyproduct.com.
    - g. Delta Faucet Co, Indianapolis, IN www.deltafaucet.com or Delta Faucet Canada, London, ON (519) 659-3626.
    - h. Dearborn Brass, Cleveland, OH www.dearbornbrass.com.
    - i. Gerber Plumbing Fixtures LLC, Woodridge, IL www.gerberonline.com.
    - j. Josam Co, Michigan City, IN www.josam.com.
    - k. Jay R. Smith Mfg. Co, Montgomery, AL www.jrsmith.com.
    - I. Kohler Co Plumbing Div, Kohler, WI www.us.kohler.com.

- m. McGuire Manufacturing Co, Cheshire, CT www.mcguiremfg.com.
- n. Mifab Manufacturing Inc, Amherst, NY www.mifab.com.
- o. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON www.moen.com.
- p. Olsonite Corp, Newnan, GA www.olsonite.net or Olsonite Co Ltd, Tilbury, ON (519) 682-1240.
- q. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
- r. South Fork Manufacturing, Coalville, UT (801) 953-3001 www.dirt-grabber.com.
- s. Toto U.S.A., Inc., Morrow, GA www.totousa.com
- t. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
- Watts Drainage, Spindale, NC www.wattsdrainage.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
- v. Zurn Industries, LLC, Erie PA www.zurn.com. or Zurn Industries Ltd, Mississuaga, ON (905) 795-8844.

#### B. Performance:

- 1. Design Criteria:
  - a. Meet or exceed ASME A112.19.2/CSA B45.1 for Vitreous China Plumbing Fixtures.
  - Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
  - c. All materials NOT required to be low lead compliant.

#### C. Materials:

- 1. Water Closets:
  - a. Floor Mounted With Tank:
    - 1) Standard Fixture:
      - a) Water usage of 1.6 gallons per flush.
      - b) MaP Score of 1000 grams.
      - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Cadet 3 Elongated 215CA.004.
        - (2) Gerber: Avalanche AV-21-812.
        - (3) Kohler: Wellworth K-3978.
        - (4) Sloan: WETS-9003-1.6.
        - (5) Toto: 'Drake' CST744S.
    - 2) HET (High-Efficiency Toilet) Standard Fixture:
      - a) Water usage of 1.28 gallons per flush.
      - b) Also required for all California Projects.
      - c) MaP Score of 1000 grams.
      - d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Cadet 3 Elongated 215CA.004.
        - (2) Gerber: Avalanche WS-21-812.
        - (3) Kohler: Wellworth K-3948.
        - (4) Sloan: WETS-9000-1.28.
        - (5) Toto: 'ECO Drake' CST744E.or CST744EG.
    - 3) Handicap Accessible Fixture:
      - a) Water usage of 1.6 gallons per flush.
      - b) 18 inch maximum rim height.
      - c) MaP Score of 1000 grams.
      - d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - 1) American Standard: Cadet 3 Right Height Elongated 215AA.004.
        - (2) Gerber: Avalanche AV-21-818.
        - (3) Kohler: Highline K-3979.
        - (4) Sloan: WETS-9023-1.6.
        - (5) Toto: 'ADA Drake' CST744SL.
    - 4) HET (High-Efficiency Toilet) Handicap Accessible Fixture:
      - a) Water usage of 1.28 gallons per flush.
      - b) Also required for all California Projects.
      - c) 18 inch maximum rim height.
      - d) MaP Score of 1000 grams.
      - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Cadet Pro Right Height Elongated 215AA.104.
        - (2) Gerber: Avalanche WS-21-818.
        - (3) Kohler: Highline K-3949.
        - (4) Sloan: WETS-9020-1.28.
        - (5) Toto: 'ADA Drake' CST744EL.

- Water Closet Accessories:
  - a. Seats:
    - 1) Provide split front type with check hinge.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Standard And Handicap Accessible Fixtures:
        - (1) American Standard: 5905.100SS.
        - (2) Bemis: 1655SSC.
        - (3) Beneke: 527 SS.
        - (4) Church: 9500SSC.
        - (5) Kohler: K-4731-C.
        - (6) Olsonite: 95SSC.
        - (7) Toto SC534.
  - b. Supply Pipe And Stop:
    - 1) Provide chrome plated quarter-turn brass ball valve, 12 inch braided stainless steel riser, and chromeplated steel flange.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) McGuire: BV2166CC.
      - b) Zurn: Z8804.
  - c. Flush Valve Filter:
    - 1) Required in following flush valves:
      - a) Sloan.
      - b) Zurn.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.
- 3. Urinals:
  - a. HEU (High-Efficiency Urinal):
    - 1) Water usage of 0.125 gallons (pint) per flush.
    - 2) Required for all California Projects.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) American Standard: Washbrook FloWise 6590.001.
      - b) Kohler: Bardon K-4904-ET.
      - c) Sloan SU-1009.
      - d) Toto: UT445U.
- 4. Urinal Accessories:
  - a. Carrier / Support:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Josam.
      - b) Jay R. Smith.
      - c) Mifab.
      - d) Wade.
      - e) Zurn.
  - b. Flush Valve:
    - 1) HEU (High-Efficiency Urinal):
      - a) Proximity sensor type with battery.
      - b) Low flow, 0.125 gallons (pint) per flush maximum.
      - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard 6063.013.
        - (2) Delany: PL 1451-0.125PL.
        - (3) Delta: 81T231BTA-05 factory set to 0.125 gallons per flush.
        - (4) Moen: 8316.
        - (5) Sloan: 8186-0.125.
        - (6) Zurn: ZEMS6003AV-ULF-CP with maintenance override button.
  - c. Flush Valve Filter:
    - 1) Required in following flush valves:
      - a) Sloan.
      - b) Zurn
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.

# 3.1 INSTALLATION

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
  - Seal wall-mounted fixtures around edges to wall with sealant specified in Section 07 9213 'Elastomeric Joint Sealants'.
  - 2. Attach wall-hung fixtures to carriers.
  - 3. Support fixture hanger or arm free of finished wall.
- C. Adjust flush valves for proper flow.
- D. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.
- E. Mounting:
  - Urinals:
    - a. Standard: 24 inches from floor to bottom lip.
    - b. Handicap Accessible: 17 inches maximum from floor to bottom lip.
- F. Water Closets:
  - 1. Floor or Wall Fixtures:
    - a. Make fixture connections with approved brand of cast iron flange, soldered or caulked securely to waste pipe. Make joints between fixtures and flanges tight with approved fixture setting compound or gaskets. Caulk between fixtures with sealant specified in Section 07 9213. Point edges.
- G. Flush Valve Filters:
  - 1. Install in Sloan and Zurn only flush valves.
  - 2. Install after water lines have been flushed out, but before turning water into flush valve.

## 3.2 CLEANING

A. Polish chrome finish at completion of Project.

# SECTION 22 4216 COMMERCIAL LAVATORIES AND SINKS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.

#### 1.2 REFERENCES

- A. Reference Standard:
  - 1. American National Standards Institute / International Code Council:
    - a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.
  - 2. American Society of Mechanical Engineers / Canadian Standards Association (CSA Group):
    - a. ASME A112.18.1-2012/CSA B125.1-12, 'Plumbing Supply Fittings'.
    - b. ASME A112.19.1-2013/CSA B45.2-13, 'Enamelled cast iron and enamelled steel plumbing fixtures'.
    - c. ASME A112.19.3-2008/CSA B45.4-08 (R2013), 'Stainless steel plumbing fixtures'.
  - 3. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2015, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2016, 'Drinking Water System Components Lead Content'.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

## 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard Warranty against material or Manufacturing defects.

#### PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

#### A. Manufacturers:

- Manufacturer Contact List:
  - a. American Standard Brands, Piscataway, NJ www.americanstandard-us.com or American Standard Canada, Mississauga, ON www.americanstandard.ca.
  - b. Brocar Products Inc, Cincinnati, OH www.brocar.com.
  - c. CECO, Huntington Park, CA www.cecosinks.com.
  - d. Chicago Faucet Co, Des Plaines, IL www.chicagofaucets.com.
  - e. Dearborn Brass, Tyler, TX www.dearbornbrass.com.
  - f. Delta Faucet Co, Indianapolis, IN www.deltafaucet.com or Delta Faucet Canada, London, ON (519) 659-3626.
  - g. Engineered Brass Co. (EBC) (Just Manufacturing Co.), Franklin Park, IL www.justmfg.com.
  - h. Elkay Manufacturing Co, Oak Brook, IL www.elkay.com.
  - i. Gerber Plumbing Fixtures LLC, Woodridge, IL www.gerberonline.com.
  - j. Josam Co, Michigan City, IN www.josam.com.
  - k. Jay R. Smith Maufacturing Co, Montgomery, AL www.jrsmith.com.
  - I. Just Manufacturing Co, Franklin Park, IL www.justsinks.com.
  - m. Keeney Manufacturing Co, Newington, CT www.keeneymfg.com.
  - n. Kindred USA, Midland, ON www.kindred-sinkware.com.
  - o. Kohler Co Plumbing Div, Kohler, WI www.us.kohler.com.
  - p. McGuire Manufacturing Co, Cheshire, CT www.mcguiremfg.com.
  - q. Mifab Manufacturing Inc, Amherst, NY www.mifab.com.
  - r. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON www.moen.com.
  - s. Omni Flow Controls, Harbor City, CA www.chronomite.com or www.omniflowcontrols.com.
  - t. Plumberex Specialty Products, Palm Springs, CA www.plumberex.com.
  - u. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
  - v. Speakman Company, New Castle, DE www.speakmancompany.com.
  - w. Symmons, Braintree, MA www.symmons.com.
  - x. T & S Brass & Bronze Works Inc, Travelers Rest, SC www.tsbrass.com.
  - y. TrueBro Inc, Collierville, TN www.truebro.com.
  - z. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
  - aa. Watts Drainage, Spindale, NC www.wattsdrainage.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
  - bb. Zurn Commercial Brass, Sanford, NC www.zurn.com or Zurn Industries Ltd, Mississuaga, ON (905) 795-8844.
  - cc. Zurn Cast Metal, Erie, PA www.zurn.com.

#### B. Performance:

- 1. Design Criteria:
  - Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
  - b. Faucets and other fixture fittings shall conform to requirements of ASME A112.18.1/CSA B125.1.
  - c. Lavatories shall conform to requirements of:
    - 1) Enamelled cast iron and enamelled steel fixtures.
      - a) ASME A112.19.1/CSA B45.2.
      - b) CSA B45.2/ASME A112.19.1.
    - 2) Stainless steel plumbing fixtures:
      - a) ASME A112.19.3/CSA B45.4.
      - b) CSA B45.4/ASME A112.19.3.

#### C. Components:

- 1. Lavatories And Fittings:
  - a. Standard and Handicap Accessible Counter Top Lavatories:
    - 1) Size 20 by 17 inches nominal.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) American Standard: Aqualyn 0476.028.
      - b) Gerber: Luxoval 12-844.
      - c) Kohler: Pennington K-2196-4N.

- b. Standard and Handicap Accessible Self Supporting Lavatories:
  - 1) Size: 20 by 18 inches nominal.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) American Standard: Lucern 0355.012.
    - Kohler: Greenwich K-2032.
  - 3) Carrier / Support:
    - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - Josam: 17100.
      - (2) Jay R. Smith: 0700.
      - (3) Mifab: MC-41.
      - (4) Wade: 520-M36.
- c. Lavatory Fittings:
  - 1) Faucet and Grid Strainer For Standard Sinks:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
      - (2) Chicago: 802CP with 327XCP.
      - (3) Delta: 2529HDF.
      - (4) Gerber: C4-44-412.
      - (5) Kohler: K-7404-5A with K-7715 strainer.
      - (6) Moen: 8215 with 14750 grid strainer.
      - (7) Speakman: SC 3072.
      - (8) T & S: B-0890 with B-0899 Grid Strainer.
      - (9) Zurn: Z81104 with McGuire 155A Grid Strainer.
  - 2) Faucet and Grid Strainer For Handicap Accessible Sinks:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
      - (2) Chicago: 802-317CP with K7715 strainer.
      - (3) Delta: 2529HDF.
      - (4) Gerber: CO-44-412.
      - (5) Kohler: K-7404-5A with K-13885 strainer.
      - (6) Moen: 8215 with14750 grid strainer.
      - (7) Speakman: SC 3074.
      - (8) T & S: B-0890 with B-0899 Grid Strainer.
      - (9) Zurn: Z-81104 with McGuire 155A grid strainer.
  - 3) Flow Control Fitting:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide vandal-proof type in place of aerator. Flow shall be 0.5 gpm.
    - Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - (1) Omni L-200 Series by Chronomite Laboratories.
  - 4) Supply pipes with stops:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide chrome plated quarter-turn brass ball valve, 12 inches long braided stainless steel riser, and chrome-plated steel flange.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) McGuire: BV2165CC.
      - (2) Zurn: Z8804 LRQ-PC.
  - 5) Trap:
    - a) Description:
      - (1) 17 gauge tube 'P' trap, chrome plated.
    - b) Design Criteria:
      - (1) Not required to meet NSF International Standards for Lead Free.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Dearborn.

- (2) Engineered Brass Company (EBC).
- (3) Keeney Manufacturing.
- (4) McGuire.
- (5) Zurn.
- 6) Safety Covers for Handicap Accessible Lavatories:
  - a) Description:
    - 1) Provide protection on water supply pipes and on trap.
  - b) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Trapwrap by Brocar Products Inc.
    - (2) Pro Wrap by McGuire Products.
    - (3) Lav Guard 2 by TrueBro.
    - (4) Pro Extreme by Plumberex.
- 2. Stainless Steel Sinks And Fittings:
  - a. Design Criteria:
    - 1) Not required to meet NSF International Standards for Lead Free.
    - 2) Self-rimming, 18 gauge stainless steel, satin finish.
  - b. Double Compartment Sinks:
    - 1) Design Criteria:
      - a) Not required to meet NSF International Standards for Lead Free.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Elkay: LR 3319.
      - b) Just: DL-1933-A-GR.
      - c) Kindred: LBT 4408P-1.
  - c. Single Compartment Sink:
    - 1) Description:
      - a) Size: 22 by 19.5 inches nominal.
    - 2) Design Criteria:
      - a) Not required to meet NSF International Standards for Lead Free.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Elkay: LR-2219.
      - b) Just: SL-1921-AG-R.
      - c) Kindred: LBS 4008P-1.
  - d. Stainless Steel Sink Fittings:
    - 1) Gooseneck Faucets for Two Compartment Serving Area Sinks:
      - a) Design Criteria:
        - (1) Meet NSF International Standards for Lead Free.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Moen: 8227. (swivel).
        - (2) Speakman: SC-5724. (swivel).
    - 2) Faucets for Sacrament Preparation Room Sink:
      - a) Design Criteria:
        - 1) Meet NSF International Standards for Lead Free.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Gooseneck Swivel Spout 7100.241H.
        - (2) Chicago: 350-ABCP.
        - (3) Delta: 27C643-R4.
        - (4) Gerber: C4-44-701.
        - (5) Kohler: K-7895-C.
        - (6) Moen: 8103.
        - (7) Speakman: SC-7112.
        - (8) T & S: 0305-01.
        - (9) Zurn: Z-825B1FC.
    - 3) Supply pipes with stops:
      - a) Design Criteria:
        - (1) Meet NSF International Standards for Lead Free.
      - b) Accessories:
        - (1) Provide chrome plated quarter-turn brass ball valve, 12 inches long braided stainless steel riser, and chrome-plated steel flange.
      - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) McGuire: BV2165CC.
        - (2) Zurn: Z8804 LRQ-PC.

- 4) Flow Control Fitting:
  - a) Design Criteria:
    - (1) Meet NSF International Standards for Lead Free.
  - b) Accessories:
    - (1) Provide vandal-proof type in place of aerator. Flow shall be 1.5 gpm.
  - c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Omni A-200 Series by Chronomite Laboratories.
- 5) Waste For Standard Stainless Steel Sinks:
  - a) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Elkay: LK-99.
    - (2) Kindred: 1130.
    - (3) Kohler: K8801.
    - (4) McGuire: 151.
    - (5) Zurn Z-8740-PC.
- 6) Waste For Sacrament Preparation Room Sink:
  - a) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Elkay: LK18.
    - (2) Just: J-35FS.
    - (3) Kohler: K8807G.
    - (4) McGuire: 152.
    - (5) Zurn Z-8739-PC.
- 7) Trap:
  - a) Description:
    - (1) 17 gauge tube 'P' trap, chrome plated.
  - b) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - Dearborn.
    - (2) Engineered Brass Company (EBC).
    - (3) Keeney Manufacturing.
    - (4) McGuire: MCT150075NCZN.
    - (5) Zurn.
- 3. Miscellaneous Sinks And Fittings:
  - a. Service Sink:

3)

- 1) Description:
  - Floor Type, enameled cast iron, 28 inches square with vinyl coated rim guard or 24 inches square with Stainless Steel rim guard.
- 2) Design Criteria:
  - a) Not required to meet NSF International Standards for Lead Free.
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) American Standard: Florwell Enameled Cast Iron 7741.000 with vinyl rim guard 7745.811.
    - b) CECO: 871.
    - c) Kohler: Whitby K-6710.
    - d) Zurn: 5850.
- 4) Service Sink Fittings:
  - a) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - b) Supply:
    - (1) Mounting height of 42 inches.
    - (2) Provide 48 inch hose and clamp unless spout is threaded.(3) Category Four Approved Products. See Section 01 6200 fc
      - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (a) American Standard: Exposed Yoke Wall-Mount Utility Faucet with top brace 8344.112 with threaded spout.
        - (b) Chicago: 897 CP.
        - (c) Delta: 28T9 with 28T911 hose and bracket.
        - (d) Gerber: C4-44-654.
        - (d) Kohler: K-8928.
        - (e) Moen: 8124.
        - (f) Speakman: SC-5812.

- (g) T&S: B-0665-BSTP.
- (h) Zurn: Z-843M1.
- c) Drain and Strainer:
  - (1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) American Standard: Grid strainer 7721.038.
    - (b) Kohler: K-9146, 3 inch IPS.
- d) Trap: Cast iron, PVC, or ABS to match piping.

## 3.1 INSTALLATION

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
- C. Seal wall-mounted fixtures around edges to wall and counter top fixtures to countertop with sealant specified in Section 07 9213.
- D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.
- E. Install fixtures with accessible stop or control valve in each hot and cold water branch supply line.
- F. Self-Supporting Lavatories: Install using carriers. Support carrier free of finished wall.
- G. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.
- H. Install Handicap Accessible Lavatories as per ADA height mounting requirements.

## 3.2 CLEANING

A. Polish chrome finish at completion of Project.

# SECTION 22 4240 FONT FAUCETS, SUPPLIES, AND TRIM

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish and install miscellaneous plumbing specialties specified in this Section as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping' for ball valves'.
  - 3. Section 22 3413: 'Instantaneous, Tankless, Gas Domestic Water Heaters'.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

#### A. Manufacturers:

- 1. Manufacturer Contact List:
  - American Standard Plumbing, Piscataway, NJ www.americanstandard.com or American Standard Division of Wabco-Standard Ltd, Toronto, ON www.americanstandard.ca.
  - b. Cooper B-Line, Highland, IL www.bline.com.
  - c. Dearborn Brass, Cleveland, OH www.dearbornbrass.com.
  - d. Eljer Plumbingware, Dallas, TX or Eljer Mfg Canada Inc, Mississauga, ON www.eljer.com.
  - e. Hoffman Engineering, Anoka, MN www.hoffmanonline.com
  - f. HO Trerice, Oak Park, MI www.hotco.com.
  - g. Jones Stephens Corp, Moody, AL www.plumbest.com.
  - h. Josam Co, Michigan City, IN www.josam.com.
  - i. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
  - j. Kohler Co Plumbing Div, Kohler WI www.us.kohler.com.
  - k. Marsh Instruments, Newell, WV www.marshbellofram.com.
  - I. Plumbing Products Co / Trim To The Trade, Thousand Palms, CA www.trimtothetrade.com.
  - m. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
  - n. Weiss Instruments Corp, Holtsville, NY www.weissinstruments.com.

# B. Components:

- 1. Font Valve Box (match size indicated on Contract Drawings):
  - a. 18 inches tall by 12 inches wide 4 inches deep electrical equipment cabinet flush with removal trim and hinged locking door
  - b. Type Two Acceptable Products:
    - 1) Model 18124 TCF, less wood panel, by Cooper B-Line.
    - 2) Model ATC18124F, less wood panel, by Hoffman Engineering.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.
- 2. Font Fittings:
  - a. Supply Outlet:
    - 1) Chrome plated, 1/2 inch tapping, 5 inches long.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) 8888.056 by American Standard.
      - b) K-6854 by Kohler.
  - b. Temperature Gauge:
    - Range 30 to 180 deg F, 3-1/2 inch diameter dial, 1/2 inch MNPT connection by 5-3/8 inches immersion length.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) 3375 by Marsh.
      - b) 3-1/2 V80030 with bulb 5-3JC1 by HO Trerice.

- c) 3BM25 by Weiss.
- c. Traps:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Z-1000 by Tubular Brass Plumbing Products
    - o) .08150 by Josam.
    - c) W-2425-T by Wade.
    - d) 7220 by J. R. Smith.
- d. Drain And Overflow:
  - 1) 2 inch IPS Roman tube drain complete with bolts, '0' ring, and top.
  - 2) 1-1/2 inch IPS overflow drain complete with grill, crown, and screws.
  - 3) Polished chrome finish.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) 4T-6420 by Plumbing Products / Trim To The Trade.

PART 3 - EXECUTION: Not Used

# SECTION 22 4700 DRINKING FOUNTAINS AND WATER COOLERS

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install drinking water cooling system units as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping'.

#### 1.2 REFERENCES

- A. Reference Standard:
  - 1. American National Standards Institute / International Code Council:
    - a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.
  - 2. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components Lead Content'.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Handicap Accessible Products to meet ANSI/ICC A117 Accessible requirements.
  - 2. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Acorn Aqua, City of Industry, CA www.acornaqua.com.
    - b. Elkay Manufacturing Co, Oak Brook, IL www.elkay.com.
    - c. Halsey Taylor, Oak Brook, IL www.halseytaylor.com.
    - d. Oasis, Tri Palm International, Columbus OH www.oasiswatercoolers.com.
- B. Design Criteria:
  - 1. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
  - 2. Interior exposed pipe, valves, and fixture trim shall be chrome plated.
  - 3. Do not use flexible water piping.

#### C. Materials:

- 1. Handicap Accessible Bi-Level Fountain:
  - a. Include accessory fountain. Vandal proof operating bar on front and both sides. 7.8 GPH minimum of 50 deg F water with 90 deg F room temperature, 1/5 horsepower motor, 120 V, 60 Hz, single phase. Flexiguard or chrome plated brass bubbler.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) AcornAqua: AquaAccess A172408B-UBL.

- 2) Elkay: Model EZSTL8LC.
- 3) Halsey Taylor: HAC8FSBL-Q-ADA.
- 4) Oasis: PG8ACSL.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install fixtures with accessible stop or control valve.
- B. Mounting:
  - General:
    - a. Coordinate location of fountain with location and height of electrical outlet to ensure concealment of outlet by fountain.
    - b. Anchor bottom of fountain to wall.
    - c. Install 3/8 inch IPS union connection and Chicago No. 441 stop to building supply line.
    - d. Install 1-1/4 inch IPS slip cast brass 'P' trap. Install trap so it is concealed.
  - 2. Accessible Drinking Fountains:
    - a. Spout outlets of wheelchair accessible drinking fountains shall be 36 inches maximum above floor.
    - b. Spout outlets of drinking fountains for standing persons shall be 38 inches and 43 inches maximum above floor

# 3.2 CLEANING

A. Polish chrome finish at completion of Project.

**END OF SECTION** 

# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

# DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING:

DIVISION 23	- HEATING, VENTILATING, AND AIR-CONDITIONING:
23 0000	Heating, Ventilating, and Air-Conditioning
23 0501	Common HVAC Requirements
23 0505	
23 0529	. 0
23 0553	1 8 1 1
23 0713	
23 0719	1 5
23 0933	Electric and Electronic Control System for HVAC
23 1000	Facility Fuel Systems
23 1123	Facility Natural Gas Piping
23 2000	HVAC Piping and Pumps
23 2300	Refrigerant Piping
23 2600	Condensate Drain Piping
23 3000	HVAC Air Distribution
23 3001	Common Duct Requirements
23 3114	Low-Pressure Metal Ducts
23 3300	
23 3346	
23 3401	
23 3713	the state of the s
23 3714	
23 3723	
23 4000	HVAC Air Cleaning Devices
23 4100	Air Filters
23 5000	Central Heating Equipment
23 5135	Air Piping
23 5417	Gas-Fired Furnaces
23 6000	Central Cooling Equipment
23 6214	Air-Cooled Condensing Units: Air Conditioning (5 Ton or Less)
23 7000	Central HVAC Equipment
23 7223	Packaged Energy Recovery Ventilation Units
23 8000	Decentralized HVAC Equipment
23 8333	Electric Radiant Wall Heaters

# SECTION 23 0501 COMMON HVAC REQUIREMENTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for HVAC systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Interface with Testing And Balancing Agency.
  - 4. Furnish and install sealants relating to installation of systems installed under this Division.
  - 5. Furnish and install Firestop Penetration Systems for HVAC system penetrations as described in Contract Documents.
  - 6. Furnish and install sound, vibration, and seismic control elements.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, and equipment for mechanical systems installed under other Sections.
- C. Related Requirements:
  - Section 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
  - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 3. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 4. Section 07 9213: 'Elastometric Joint Sealant' for quality of sealants used at building exterior.
  - 5. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustical sealants.
  - 6. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - Section 26 2913: 'Enclosed Controllers' for magnetic starters and thermal protective devices (heaters) not factory
    mounted integral part of mechanical equipment.
  - 8. Division 26: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.
  - 9. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 10. Sections Under 33 5000 Heading: Fuel Distribution Utilities.

# 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
  - 2. Shop Drawings:
    - a. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.
    - b. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
    - c. Drawing of each temperature control panel identifying components in panels and their function.
    - d. Other shop drawings required by Division 23 trade Sections.

- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. HVAC Firm:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
    - b. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.

#### C. Closeout Submittals:

- Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
    - At beginning of HVAC section of Operations And Maintenance Manual, provide master index showing items included.
      - Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and HVAC, Sheet Metal, Refrigeration, and Temperature Control subcontractors.
      - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
        - (1) List of HVAC equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
        - (2) Manufacturer's maintenance instructions for each piece of HVAC equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
        - (3) Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
      - c) Provide operating instructions to include:
        - (1) General description of each HVAC system.
        - (2) Step by step procedure to follow in putting each piece of HVAC equipment into operation.
        - (3) Provide diagrams for electrical control system showing wiring of items such as smoke detectors, fuses, interlocks, electrical switches, and relays.
  - b. Warranty Documentation:
    - 1) Include copies of warranties required in individual Sections of Division 23.
  - c. Record Documentation:
    - 1) Manufacturers documentation:
      - a) Copies of approved shop drawings.
      - b) Questar rebate information.

# 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Perform work in accordance with applicable provisions of Gas Ordinances applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  - 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
  - 3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Company:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in HVAC installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  - 2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Accept valves on site in shipping containers with labeling in place.
- B. Storage And Handling Requirements:
  - 1. In addition to requirements specified in Division 01:
    - a. Stored material shall be readily accessible for inspection by Architect until installed.
    - b. Store items subject to moisture damage, such as controls, in dry, heated spaces.
    - c. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.
- B. Special Warranty:
  - 1. Guarantee HVAC systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  - 2. If HVAC sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local HVAC sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

# PART 2 - PRODUCTS

#### 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  - 1. Use domestic made pipe and pipe fittings on Project.
  - 2. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
  - 1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
  - 2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
- D. Valves:
  - 1. Valves of same type shall be of same manufacturer.

# PART 3 - EXECUTION

#### 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

#### 3.2 EXAMINATION

#### A. Drawings:

- 1. HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
- 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over HVAC Drawings.
- 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

#### B. Verification Of Conditions:

- Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
- 2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- 3. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
- 4. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

# 3.3 PREPARATION

- A. Changes Due To Equipment Selection:
  - 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
  - 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
  - Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of system resulting from selection of equipment.
  - 4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

### 3.4 INSTALLATION

- A. Interface With Other Work:
  - 1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
  - 2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
  - 3. Testing And Balancing:
    - a. Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
    - b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
  - 1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
  - 2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.

- 3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
- 4. Determine exact route and location of each pipe and duct before fabrication.
  - a. Right-Of-Way:
    - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and drains shall normally have right-of-way.
    - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
  - b. Offsets, Transitions, and Changes in Direction:
    - Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
    - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

#### D. Piping:

- Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
  - a. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
  - b. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
    - 1) Arrange so as to facilitate removal of tube bundles.
    - 2) Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
      - a) Make connections of dissimilar metals with di-electric unions.
      - b) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
    - 3) Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.
    - 4) Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
    - 5) Install piping to insure noiseless circulation.
    - 6) Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
  - c. Do not install piping in shear walls.
- 2. Properly make adequate provisions for expansion, contraction, slope, and anchorage.
  - a. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.
  - b. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
  - c. Make changes in direction with proper fittings.
  - d. Expansion of Thermoplastic Pipe:
    - 1) Provide for expansion in every 30 feet of straight run.
    - 2) Provide 12 inch offset below roof line in each vent line penetrating roof.
- 3. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
  - a. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
  - b. Sleeves through floors and foundation walls shall be watertight.
- 4. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
- 5. Remove dirt, grease, and other foreign matter from each length of piping before installation.
  - a. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
  - Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
  - c. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- E. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at HVAC system penetrations through walls, ceilings, roofs, and top plates of walls.

- F. Sealants:
  - 1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
  - 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

# 3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
  - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  - 2. Surface finishes shall exactly match existing finishes of same materials.

# 3.6 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
  - 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
  - 2. Repeat tests on new material, if requested.

#### 3.7 SYSTEM START-UP

- A. Off-Season Start-up:
  - 1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
  - 2. Notify Owner seven days minimum before scheduled start-up.
  - 3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
  - 4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
  - 1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
  - 2. Make adjustments to insure that:
    - a. Equipment alignments and clearances are adjusted to allowable tolerances.
    - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
    - c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
    - d. Miscellaneous alignings, tightenings, and adjustings are completed so systems are tight and free from leakage and equipment performs as intended.
  - 3. Motors and accessories are completely operable.
  - 4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
  - 5. Adjust drives for proper alignment and tension.
  - 6. Make certain filters in equipment for moving air are new and of specified type.
  - 7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

# 3.8 CLEANING

- A. Clean exposed piping, ductwork, and equipment.
- B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.
- C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.

# 3.9 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  - 1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing:
    - a. Minimum Instruction Periods:
      - 1) HVAC: Eight (8) hours.
      - 2) Temperature Control: Six (6) hours.
      - 3) Refrigeration: Four (4) hours.

# 3.10 PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.
- B. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.
- C. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

END OF SECTION

# SECTION 23 0505 MECHANICAL REBATES

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Related Sections
  - 1. Section 23 0501: Common HVAC Requirements
  - 2. Section 23 5417: Gas-Fired Furnaces

# PART 2 - PRODUCTS: Not used.

#### PART 3 - EXECUTION

# 3.1 APPLICATION

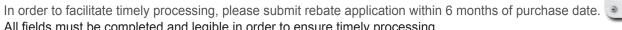
- A. Provide the following information for each furnace installed:
  - 1. Itemized receipt/invoice.
  - 2. Retailer/contractor name, address and phone number.
  - 3. Purchase/installation date.
  - 4. Quantity.
  - 5. Size.
  - 6. Description.
  - 7. Manufacturer.
  - 8. Model.
  - 9. Serial Number.
  - 10. kBtu input.
  - 11. Purchase price.
  - 12. Proof of payment.
- B. Documentation shall be submit on the current "ThermWise Business Rebate" form (see attached example) found on www.thermwise.com at the pre-substantial meeting.

# END OF SECTION

# ThermWise® Business Rebate - UTAH

# Commercial **HVAC** Application

Promotion Dates: 01/01/2014 - 12/31/2014





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	<b>MEASURES?</b> If multiple measu complete and include with your					ness/Multiplel	Measures.x	Isx
Qualifying Measures	Required Efficiency	Date Installed	Manufacturer	Model Number	Serial	Number	kBtu Input	Rebate
High-Efficiency	☐ AFUE 92% - 94.9%	(ואוואו) (איז דוטטוואו)						\$200
Natural Gas Furnace	☐ AFUE 95% or higher							\$350
High-Efficiency Gas	☐ AFUE 95% - 97.9%							\$400
Furnace equipped	AFUE 98% or higher	, ,						\$450
with ECM*	*Invoice or other documentation m	ust clearly identify th	<b>l</b> ne furnace model you ai	่ I re applying for <u>is</u> equipped พ	l rith an ECM/va	ariable speed mo	l otor in order t	
Natural Gas Boiler	☐ ≥ 85% AFUE (<300,000 Btu/hr)					,		\$2/kBtu
(hot water)		1 1						\$3.25/kBtu
Natural Gas Boiler	☐ ≥ 85% AFUE (<300,000 Btu/hr)							
(steam)	> 82% TE (>300,000 Btu/hr)	, ,						\$2/kBtu
High-Efficiency	□ ≥ 83% < 90% TE Non-condensing							\$1.25/kBtu
Natural Gas Unit Heater	☐ ≥ 90% TE Condensing	, ,						\$6/kBtu
	<del></del>	/						φοπιστα
Must replace existing gas non-i of new construction. Replacing	m (where not required by code) infrared systems or be installed as part existing infrared systems is not eligible.							\$5/kBtu
	t Control Where not required by code.	1 1						\$250
Used, rebuilt or leased e	quipment is not eligible. All fiel	ds above are requi	red Natural gas servic	e is required in order to be	l eliaible for thi	is offer		
	hr: British Thermal Units per hour capa						Commutated M	otor ]
ADDI ICATION INSTR	UCTIONS & CHECKLIST							
_	all a qualified measure where th		ŭ			ThermWise	Business R	ebates
	Conditions on page 2 of this ap		•		s page.	Offer # H34	6840	
	d and signed application with th	0	•	ŭ		2223 S High Salt Lake Ci		
A copy of your	most recent Questar Gas bill. (F	Primary gas heatir	ng must be on GS rat	e schedule to qualify.)				
	copy of your <u>itemized</u> receipt/in description, manufacturer, m				ımber, purc	hase and/or i	nstall date,	
▶ Efficiency requ	irements documentation, AHR	Certificate from y	www.ahridirectory.org	or a copy of the manufa	acturer spec	ification sheet,	if applicab	le.
	copy of the Third Party Paymer							
	tocopy your entire submission f		aymomi toroador on	mpar to obtain a copy of		molado min ye	our oubilines	.011.
CUSTOMER INFORMA		or your rocordo.						
	nent numbers are located on your Que	star Gas hill Both are	required for processing.	/isit www.smartenergy-zone	com/thormwis	e for an evample	of where they	are located
Account and Convice Agreem	one numbers are located on your Que	star Gus biii. Botir arc	required for processing.	www.smartenergy-zone.	zoni/archiwis	c for all example	or where they	are located.
Questar Customer A	ccount Number*:		Ser	vice Agreement Number	*:			
Please write your Busine	ess Name or First and Last Name e	xactly how it appears	s on your Questar Gas b	ill in the fields provided below	<u>v.</u>			
Business Name:		First Name:		Last Nar	me:			
Installation Address:			City:		State: _	Zip	Code:	
Mailing Address:			City:		State: _	Zip	Code:	
Email:			Phone:	Taxpave	er ID Number:			
			· · · · · ·					
ACCEPTANCE OF TE	RMS -							
I hereby certify that all inform	ation provided is accurate. I have rea	ad all terms and cond	ditions on both pages of t	his application and acknowle	dge that Quest	tar Gas may verif	y all informati	on provided.
Applicant Signature:					Date:	1	1	
(Questar Gas account holder					_ Date			
INTERNAL USE ONLY!	For more	e information abou	ut this offer or to find	out more about products		INT	ERNAL USE	ONLY!

# TERMS AND CONDITIONS

**Rebate Availability -** The Questar Gas® ThermWise® rebate programs have been approved by the Public Service Commission of Utah. All rebates subject to change with 30 days notice. All equipment/supplies (measure) must be new and purchased and installed prior to submitting a rebate application. **Measures must have been purchased and installed on or after January 1, 2014.** Applications must include all information requested. Failure to provide this information may result in the delay or denial of the rebate.

Rebate Eligibility - It is the responsibility of the applicant to send the completed rebate application along with copies of the required proofs of purchase (receipt, invoice, etc.). Only one rebate will be paid per installation. Proof of purchase and installation receipts are required for each measure qualifying for a rebate. Measures must be purchased and installed after home's original occupancy date. Measures installed as part of the home's original construction (New Construction) are only eligible for rebates under the Builder Rebates Program. Allow approximately six weeks from receipt of completed applications, including all purchase receipts, for rebate processing. Completed form and all required documentation must be received within six months of purchase/installation.

**Rebate Qualification** - If a measure is returned after rebate is paid, Questar Gas will be reimbursed the rebate with penalty including associated legal and/or collection related costs. Qualifying rebate measures may be found online at ThermWise.com. Measures must be installed within the Questar Gas Utah/Idaho service area. Customers in Questar's Wyoming service area may be eligible for Wyoming specific measure rebates. Visit ThermWise.com for details regarding the Wyoming ThermWise Program.

**Application Details** - All applications are subject to verification by Questar Gas. If your application is selected for verification, it will not be processed until the verification process is satisfactorily completed. Questar Gas issues rebates in the form of checks, not utility bill credits. Questar Gas is not responsible if your retailer or contractor provides inaccurate information about the amount and/or conditions of the actual rebate and Questar Gas will not pay rebates for equipment that is mislabeled or misrepresented by dealers regarding rebate qualifications. Customers receiving rebates under one ThermWise program may not receive rebates for the same equipment under any other ThermWise program.

The customer hereby transfers to Questar Gas all "Environmental Attributes" attributable to the qualifying measure or its operation. Environmental Attributes means those aspects, claims, characteristics and benefits of avoided energy use associated with the measure. Environmental Attributes include all environmental benefits, avoided emission characteristics, credits, allowances, reductions, offsets, and benefits associated with the savings of energy and the reduction of generation from non-renewable energy resources, including any avoided emissions of carbon dioxide, methane, and any other greenhouse gases, but do not include any tax benefits or tax credits associated with the measure.

Rebate Limitations and Limitation of Damages - Payment of the rebate by Questar Gas does not warrant the performance of qualifying/installed measures and does not warrant that the qualifying/installed measure will deliver any specified amount of energy or cost savings. The customer shall independently evaluate any information related to the qualifying measure. Neither Questar Gas, its parent company, affiliates, subsidiaries, officers, employees, nor its contractors make any warranty, expressed or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information, estimated savings, benefits, products or processes disclosed, or represent that its use would not infringe on privately-owned rights. Reference to any specific commercial project, processes, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by Questar Gas, its parent company, affiliates, subsidiaries, officers, employees, or its contractors.

Consent to Share Information - By submitting this ThermWise application, I authorize Questar Gas Company and its agents to release the information I have included in the application to my electric service provider or another program administrator for the purposes of energy efficiency program administration and project quality assurance purposes. I understand and agree that this information may be used to help determine eligibility for available Questar Gas Company rebates. I authorize my electric service provider or another program administrator to provide Questar Gas Company with information provided to me on any incentive application I may have submitted. I understand and agree that references to Questar Gas, electric service provider and other program administrators also includes their authorized agents and program administrators.

Please allow up to 6 weeks for application processing. Rebates are paid by check in US dollars. Checks will be mailed to qualifying customers within 60 days of the postmark date on your qualified application. It is required that you cash the rebate check within 90 days of the issuance date on the check. To review the status of your application, visit <a href="https://www.smartenergy-zone.com/thermwise">www.smartenergy-zone.com/thermwise</a> or for questions regarding your application, call 1-855-499-8442 M-F 7am to 6pm MST. Excessive submissions constitute fraud and may result in federal prosecution under the U.S. mail fraud statutes (Title 18, USC 1341 and 1342). All submitted materials become property of Questar Gas and will NOT be returned.

# SECTION 23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for HVAC systems.

# B. Related Requirements:

- 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
- 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
- 3. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Stencils and band colors of gas piping used in HVAC equipment.

#### D. Related Requirements:

- Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
- 2. Section 23 0553: 'Identification For HVAC Piping And Equipment' for HVAC piping and equipment identification signage requirements.
- 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

# A. Coordination:

- 1. Section 09 9124 to coordinate with Section 23 0529 for location of identification of HVAC piping and equipment to be field painted and Section 23 0553 for painting requirements of HVAC piping and equipment.
- 2. Section 23 0529 to coordinate with Section 23 0553 for stencil and band color locations and identification requirements of HVAC piping and equipment for field application.

### 1.3 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's catalog data for each manufactured item.

#### PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

#### A. Manufacturers:

- 1. Class Two Quality Standard Approved Manufacturers. See Section 01 6200:
  - a. Anvil International, Portsmouth, NH www.anvilintl.com.
  - b. Cooper B-Line, Highland, IL www.cooperbline.com.
  - c. Erico International, Solon, OH www.erico.com.
  - d. Hilti Inc, Tulsa, OK www.hilti.com.
  - e. Minerallac, Hampshire, IL www.minerallac.com.
  - f. Thomas & Betts, Memphis, TN www.superstrut.com.
  - g. Unistrut, Wayne, MI www.unistrut.com.

#### B. Performance:

- Design Criteria:
  - a. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

b. Support rods for multiple pipes supported on steel angle trapeze hangers shall be in accordance with following table:

	R	Rods	Number of Pipes per Hanger for Each Pipe Size						
No	D.	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	2	3/8 Inch	Two	0	0	0	0	0	0
2	2	1/2 Inch	Three	Three	Two	0	0	0	0
2	2	5/8 Inch	Six	Four	Three	Two	0	0	0
2		5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	)	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

1) Size trapeze angles so bending stress is less than 10,000 psi.

#### C. Materials:

- 1. Hangers, Rods, Channels, Attachments, And Inserts:
  - a. Galvanized and UL approved for service intended.
  - b. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
  - c. Class Two Quality Standards:
    - 1) Support insulated pipes with clevis hanger equal to Anvil Fig 260 or roller assembly equal to Anvil Fig 171 with an insulation protection shield equal to Anvil Fig 167. Gauge and length of shield shall be in accordance with Anvil design data.
    - 2) Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Anvil Fig 260. Support uninsulated copper pipe from hanger equal to Anvil Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.
  - d. Riser Clamps For Vertical Piping:
    - 1) Class Two Quality Standard: Anvil Figure 261.
  - e. Furnace / Fan Coil Support Channel:
    - 1) Class One Quality Standard: Unistrut P1000.
    - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.
  - f. Swivel Attachment:
    - 1) Class One Quality Standard: Unistrut EM3127.
    - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.EXECUTION

#### PART 3 - INSTALLATION

#### A. Piping:

- 1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
  - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using support channels and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
  - b. Supports For Horizontal Piping:
    - 1) Support metal piping at 96 inches mm on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
    - 2) Support thermoplastic pipe at 48 inches on center maximum.
    - 3) Provide support at each elbow. Install additional support as required.
  - c. Supports for Vertical Piping:
    - 1) Place riser clamps at each floor or ceiling level.
    - Securely support clamps by structural members, which in turn are supported directly from building structure.
    - 3) Provide clamps as necessary to brace pipe to wall.

- d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
- e. Expansion of Thermoplastic Pipe:
  - 1) Provide for expansion in every 30 feet of straight run.
  - 2) Provide 12 inch offset below roof line in each vent line penetrating roof.

END OF SECTION

- 3 -

# SECTION 23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products Furnished But not Installed Under This Section:
  - 1. Identification of HVAC piping and equipment as described in Contract Documents including:
    - a. Paint identification for gas piping used in HVAC equipment.
    - b. Stencils and band colors for gas piping used in HVAC equipment.
- B. Related Requirements:
  - Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
  - 2. Section 22 0529: 'Hangers And Supports For Plumbing' for field installation of pipe stencils and band colors for identification for piping used with HVAC equipment.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Description:
  - 1. Abbreviations for Pipe Stencils and Equipment Identification and Band Colors for Pipe Identification:
    - a. Apply stenciled symbols and continuous painting as follows:

Pipe Type Pipe Color Symbol Gas Yellow GAS

- B. Materials:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
  - 2. Description:
    - a. Ferrous Metal:
      - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
  - 3. Performance Requirements:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Maintain specified colors, shades, and contrasts.
  - 4. Paint (one coat):
    - a. Primer:
      - 1) Ferrous Metal:
        - a) MPI 107, 'Primer, Rust-Inhibitive, Water Based'.
          - (1) Color: white.
    - b. Finish Coat (two coats):
      - 1) Ferrous Metal:
        - a) MPI 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.
  - 5. Labels:
    - a. Equipment Identification:
      - 1) Black formica, with white reveal when engraved.
      - 2) Lettering to be 3/16 inch high minimum.

#### PART 3 - EXECUTION

# 3.1 APPLICATION

#### A. Labels:

- 1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
  - a. Thermostats and control panels in mechanical spaces (attach label to wall directly above or below thermostats).
  - b. Furnaces.
  - c. Condensing units.
  - d. Accessible exhaust fans.
- 2. Engrave following data from Equipment Schedules on Drawings onto labels:
  - a. Equipment mark.
  - b. Area served.
  - c. Thermostat zone number, when different from equipment mark.
  - d. Panel and breaker from which unit is powered.

# B. Painting:

- 1. New Surfaces:
  - a. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
- 2. Leave equipment in like-new appearance.
- 3. Only painted legends, directional arrows, and color bands are acceptable.
- Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
  - a. Adjacent to each item of equipment.
  - b. At point of entry and exit where piping goes through wall.
  - c. On each riser and junction.
  - d. Every 25 feet on long continuous lines.
  - e. Stenciled symbols shall be one inch high and black.

END OF SECTION

# SECTION 23 0713 DUCT INSULATION

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install thermal wrap duct insulation as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3114: 'Low-Pressure Metal Ducts'.
  - 2. Section 23 3300: 'Acoustic Duct Accessories' for duct liner.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Certainteed St Gobain, Valley Forge, PA www.certainteed.com.
  - 2. Johns-Manville, Denver, CO www.jm.com.
  - 3. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com or Toronto, ON (416) 593-4322.
  - 4. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
  - 5. Owens-Corning, Toledo, OH or Owens-Corning Canada Inc, Willowdale, ON <a href="https://www.owenscorning.com">www.owenscorning.com</a>.

# 2.2 MATERIALS

- A. Thermal Wrap Duct Insulation:
  - 1. 1-1/2 inch or 3 inch thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft.
  - 2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F maximum.
  - 3. Type One Acceptable Products:
    - a. Type 75 standard duct insulation by Certainteed St Gobain.
    - b. Microlite FSK by Johns-Manville.
    - c. Duct Wrap FSK by Knauf Fiber Glass.
    - d. Alley Wrap FSK by Manson Insulation Inc.
    - e. FRK by Owens-Corning.
    - f. Equal as approved by Architect before bidding. See Section 01 6200.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Thermal Wrap Duct Insulation:
  - 1. Install insulation as follows:
    - a. Within Building Insulation Envelope:
      - 1) 1-1/2 inches thick on rectangular outside air ducts.
      - 2) 1-1/2 inches thick on all round ducts.
    - b. Outside Building Insulation Envelope:
      - 1) 3 inch thick on round supply and return air ducts.
      - 2) 1-1/2 inch thick on rectangular, acoustically lined, supply and return air ducts.
  - 2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches.

- a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch thick.
- b. Remove insulation from lap before stapling.
- c. Staple seams at approximately 16 inches on center with outward clenching staples.
- d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.
- B. Insulate outside of ceiling diffusers and diffuser drops same as ductwork.

END OF SECTION

DUCT INSULATION - 2 - 23 0713

# SECTION 23 0719 HVAC PIPING INSULATION

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install insulation on above ground refrigerant piping and fittings as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'General HVAC Requirements'.
  - 2. Section 23 2300: 'Refrigerant Piping'.

#### 1.2 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Keep materials and work dry and free from damage.
  - 2. Replace wet or damaged materials at no additional cost to Owner.

#### PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armacell, Mebane, NC www.armaflex.com.
    - b. Childers Products Co, Eastlake, OH www.fosterproducts.com.
    - c. Foster Products Corp, Oakdale, MN www.fosterproducts.com.
    - d. Johns-Manville, Denver, CO www.jm.com.
    - e. Knauf, Shelbyville, IN www.knauffiberglass.com.
    - f. Manson, Brossard, BC, Canada www.isolationmanson.com.
    - g. Nitron Industries, Thousand Oaks, CA www.nitronindustries.com.
    - h. Owens-Corning, Toledo, OH www.owenscorning.com or Owens-Corning Canada Inc, Willowdale, ON (416) 733-1600.
    - i. Ramco, Lawrenceville, NJ www.ramco.com.
    - j. Nomac, Zebulon, NC www.nomaco.com.
    - k. Speedline Corp, Solon, OH www.speedlinepvc.com.

# B. Materials:

- 1. Refrigeration Piping System:
  - a. Thickness:

Pipe Size, Outside Diameter	Insulation Thickness
One inch and smaller	1/2 Inch
1-1/8 to 2 inch	3/4 Inch

- 1) One inch sheet for fittings as recommended by Manufacturer.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) AP Armaflex 25/50 by Armacell.
  - b) Nitrolite by Nitron Industries. White only for exterior.
  - c) Nomaco K-Flex.
- b. Joint Sealer:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armacell 520 by Armacell.
    - b) Namaco K-Flex R-373.

- c. Insulation Tape:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armaflex AP Insul Tape by Armacell.
    - b) FT182 Tape by Nitron Industries.
    - c) Elastomeric Foamtape by Nomac K-Flex.
- d. Exterior Finish:
  - 1) For application to non-white, exterior insulation.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) WB Armaflex Finish by Armacell.
    - b) R-374 Protective Coating by Nomaco K-Flex.

#### PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Before application of insulating materials, brush clean surfaces to be insulated and make free from rust, scale, grease, dirt, moisture, and any other deleterious materials.
- B. Use drop cloths over equipment and structure to prevent adhesives and other materials spotting the work.

# 3.2 INSTALLATION

- A. Refrigeration System Piping System:
  - General:
    - a. Install insulation in snug contact with pipe.
      - 1) Insulate flexible pipe connectors.
      - 2) Insulate thermal expansion valves with insulating tape.
      - 3) Insulate fittings with sheet insulation and as recommended by Manufacturer.
    - b. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
    - c. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
    - d. Stagger joints on layered insulation. Seal joints in insulation.
    - e. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
    - f. Paint exterior exposed, non-white insulation with two coats of specified exterior finish.
  - 2. System Requirements:
    - a. Condensing Units: Install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve.

# 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Method of installing insulation shall be subject to approval of Architect. Sloppy or unworkmanlike installations are not acceptable.

### 3.4 CLEANING

A. Leave premises thoroughly clean and free from insulating debris.

### END OF SECTION

# SECTION 23 0933 ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install automatic temperature control system as described in Contract Documents.
  - 2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
  - 3. Assist in air test and balance procedure.
- B. Related Requirements:
  - 1. Section 01 4546: Duct testing, adjusting, and balancing of ductwork.
  - 2. Section 23 0501: Common HVAC Requirements.
  - 3. Section 23 3300: Furnishing and installing of temperature control dampers.
  - 4. Division 26:
    - a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
    - b. Power wiring to magnetic starters, disconnect switches, and motors.
    - c. Motor starters and disconnect switches, unless integral with packaged equipment.

# 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Installer to provide product literature or cut sheets for all products specified in Project.
    - b. Installer to provide questions of control equipment locations to Mechanical Engineer prior to installation.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Installer must provide 'Certificate of Sponsorship' signed from Approved Distributor with bid confirming Installer sponsorship.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Leave with O&M Manual specified in Section 23 0501.
    - b. Record Documentation:
      - 1) Installer's 'Certificate of Sponsorship'.

# 1.3 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to the following:
  - Installer:
    - a. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS of this specification. Initial requirements for sponsorship are:
      - 1) Receive LCBSConnect product training from Approved Distributor.
      - 2) Installer to provide Distributor sponsorship by submitting 'Certificate of Sponsorship' as Informational Submittal with bid. Certificate available as Attachment in this Specification.

#### PART 2 - PRODUCTS

# 2.1 SYSTEMS

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Air Products & Controls Ltd, Pontiac, MI www.ap-c.com.
    - b. Fire-Lite Alarms, Northford, CT www.firelite.com.
    - c. Honeywell Inc, Minneapolis, MN www.honeywell.com.
      - 1) Primary Contact: Chris Brinkerhoff, (801) 550-3344, chris.brinkerhoff@honeywell.com.
    - d. ICCA Firex, Carol Stream, IL www.icca.invensys.com.
    - e. Insul\_Guard, Salt Lake City, UT:
      - 1) Primary Contact: Dan Craner, (801) 518-3733, insul\_guard@comcast.net.
    - f. System Sensor, St Charles, IL www.systemsensor.com.
    - g. Zimmerman Technologies, Renton, WA:
      - 1) Primary Contact: Tracy Zimmerman, (425) 255-1906, zimmtech@yahoo.com.
- B. Distributors: Obtain LCBSConnect control devices, RP panels, sensors, actuators and other control equipment from following Sponsoring Approved Distributors. See Section 01 4301:
  - 1. Utah:
    - a. Control Equipment Co: (800) 452-1457 rhowe@controleguiputah.com Ray Howe.
    - b. Relevant Solutions LLC: (801) 214-3313 Kathy. Wright@relevantsolutions.com Kathy Wright.

#### C. Performance:

- Design Criteria:
  - a. Honeywell LCBSConnect control system with cloud based gateway:
    - General Requirements:
      - Controls multistage equipment, dehumidification and ventilation with 2 wire connection to controller interface location in occupied space.
      - b) Adjustable backlight to controller interface module from 15%-100%en after 30 seconds of setting adjustments.
      - c) System controllers can be programmed from the interface module or from the cloud service.
      - d) LCBSConnect controller utilizes echelon communication network with the controller located near the mechanical equipment and the system interface located in the occupied space.
      - e) System shall control outdoor ventilation air based upon system occupancy of electric / electronic actuation of dampers.
      - f) CO2 sensors will open ventilation dampers only when CO2 exceeds 1200 ppm with ppm monitored by cloud service.
      - g) LCBSConnect devices access via internet Chrome browser via gateway.
      - h) Wired room temperature sensors may be added as specified.
    - 2) System Requirements:
      - a) Up to 3 Heat/2 Cool Heat Pumps: Up to 3 Heat/2 Cool Conventional Systems.
      - b) Tri-Lingual display (Selectable for English, Spanish, or French).
      - c) 18 to 30 Vac.
      - d) 50 Hz; 60 Hz.
      - e) System switch to include Auto changeover for Heat-Cool.
      - f) 7-Day Programming.
      - g) 365-Day Event Scheduling.
      - h) Display Security Lockout options.
      - i) Minimum/ Maximum Temperature Range Stops.
      - j) Configurable over-ride option.
      - k) Remote Access via internet.
      - I) Dehumidification setting range 40 to 80% RH.

#### D. Components:

- 1. Controller, Wall Module:
  - a. Controller and Display Kit:
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Part Number Honeywell YCRL6438SR1000 consisting of following:
        - (1) Unitary Controller: Honeywell CRL6438SR1000
        - (2) Wall Module: Honeywell TS120
        - (3) Averaging Sensor: TR40 Sbus / Sylk bus temperature sensor

- (4) Discharge Air / Return Air Sensors: Honeywell C7041B2005 20k ohms.
- (5) Outdoor Air Sensor: Honeywell C7041F2006.
- Wall Cover Plate: Honeywell. 50002883-001
- b) Wall Co b. Indoor Air Sensor:
  - 1) Sylk bus network; Honeywell TR40:
- c. Internet Gateway Module(s): One (1) module per thirty (30) controllers.
  - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - a) LCBS Connect Gateway Module: Honeywell LGW1000.
- 2. Sealant Compound:
  - a. Description:
    - Non hardening waterproof, vapor proof, self-adhesive for hot or cold application for sealing conduit openings against drafts, dust moisture and noise.
  - category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Duct Seal Compound No. DS-130 by Gardner Bender, Menomonee Falls , Wl. www.gardnerbender.com.
    - 2) Thumb-Tite Sealing Compound No. 4216-92 by Nu-Calgon, St. Louis, MO www.nucalgon.com.
- 3. Guard For Cultural Center Sensors:
  - Match color of sensor.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) MSI-244 controller guard with integral wood base by Zimmerman Technologies.
    - 2) WMG 1 controller guard by Insul\_Guard.
- 4. Duct Smoke Detectors:
  - a. Duct mounted smoke detector in systems with airflow greater than 2000 CFM.
  - b. Intelligent low flow photoelectric duct smoke detector with flash scan.
  - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) System Sensor Model D4120.
- Transformer:
  - a. 120/24 V, 50VA Honeywell AT150F.
  - b. 120/24 V, 75VA Honeywell AT175F.
- 6. Damper Actuators:
  - a. Electric type equipped for Class I wiring.
  - b. Shall not consume power during Unoccupied cycle or use chemicals or expandable media.
  - c. Have built in spring return.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Honeywell MS8105A1030/U.
    - 2) Honeywell MS8105A1130 w/ End switch.
- 7. Conductors:
  - a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
  - b. Controller Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).
  - c. Echelon Network Ebus Communicating Cable:
    - 1) Class Two Quality Standard. See Section 01 6200:
      - a) CAT 4, 22 gauge (0.025 in) twisted pair, non-plenum and non-shielded cable.
- 9. Local Relay (RP) Panels For Chapel And Cultural Center Systems:
  - 16-ga screw cover, painted sheet metal. Box with cover and knockouts, pre-wired terminal strips, relay, and transformer.
  - b. Provide Labels with Distributor contact information on each panel.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Standard: LDS Model RP-6.
- 10. CO<sub>2</sub> Return Air Sensor:
  - a. Duct mount with display.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Honeywell: C7232B1006.
- 11. Control for Electric Wall Heater:
  - a. Electric Heater Control:
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Switching Relay: Part Number Functional Devices: Relay RIB2401B 20 amp rating.
      - b) Disconnect Heater Overload: FMS-TAX5, 2-Pole 1 HP starter switch.
- 12. Combination Equipment and Thermal Overload Switch Panel:
  - a. CEO panel must be provided by approved panel builder. See Section 01 6200 for definitions of Categories.

# E. Operation Sequences:

- 1. Programmable controller shall control Unoccupied and Occupied status of fan system based on adjustable seven-day program. Fan shall run continuously in Occupied Mode and cycle in Unoccupied Mode.
- 2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable controller provides automatic change over between heating and cooling.
- 3. Controller provides optional override by allowing timed override of program by pushing override on controller touch screen. This shall activate controller to Occupied Mode and system shall control to Occupied set point.
- 4. Minimum outdoor ventilation air damper, spring return type, shall open in controller Occupied Mode and remain closed in Unoccupied Mode.
- 5. Systems with CO<sub>2</sub> sensor to control minimum, spring return type, outdoor ventilation air damper:
  - a. Damper shall open in controller Occupied Mode only when CO<sub>2</sub> sensor setpoint of 1200 ppm is reached. Damper shall close if CO<sub>2</sub> level drops below 1100 ppm.
  - b. Damper shall remain closed in controller Unoccupied Mode.
- 6. Systems with Energy Recovery Ventilator (ERV):
  - a. ERV shall activate in controller Occupied Mode and remain inactive in Unoccupied Mode.
  - b. Systems with CO<sub>2</sub> sensor to control outdoor ventilation air damper, ERV in controller shall activate ONLY when TWO conditions are present:
    - 1) Controller is in Occupied Mode.
    - 2) CO<sub>2</sub> sensor setpoint of 1200 ppm is reached.

# PART 3 - EXECUTION

#### 3.1 INSTALLERS

1. Approved HVAC Sub-Contractors.

### 3.2 INSTALLATION

- A. Interface With Other Work:
  - 1. Calibrate room controllers as required during air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable.
  - 2. Instruct air test and balance personnel in proper use and setting of control system components.
  - 3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.
- B. Echelon Communication: Ebus
  - 1. Ebus cable needs to be installed at least 12 inches from lighting, motors, or low voltage switching cables.
- C. Control for Electric Wall Heater.
  - 1. Install according to local code the electric heater RIB with overload disconnect into electric heater unit.
  - 2. Commission controller to be seen by gateway and webpage.
- D. Safety Controls: Interlock duct smoke detectors to keep heating, cooling, and system fan from operating when detector is energized.
- E. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.
- F. Paste copy of record control wiring diagram on back of relay panel door cover for each multiple furnace system.

# 3.3 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
  - 2. Test each individual heating, cooling, and damper control for proper operation using control system.

#### 3.4 SYSTEM STARTUP

- For systems with LCBS Controller.
  - Contractor is responsible for a fully functioning control system accessible via internet web browser. Contractor is responsible to coordinate Network start up with assistance from local IT technician. Local IT technician shall provide available ports on network switch for LCBS gateway.
  - Contractor is responsible configuring all controllers with proper zone names, zone scheduling, proper Church conference / holiday scheduling, all to be coordinated with local FM manager. Set proper clock setting including day/month/year.
  - 3. Set Heating / Cooling to proper stages
  - Set heat cycle rates to 9 cph and cooling to 4 cph.
  - 5.
  - Set D01 relay to "Occupancy". Set System switch operation to "Automatic" changeover.
  - Set fan switch operation to "ON". 7.
  - 8. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
  - Set Occupied start times to match meeting start times; provided by local FM manager.
  - 10. Place all zone over-ride durations to one (1) hour except for Bishop and Stake area which shall be set to two (2) hours.
  - 11. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
  - 12. Set Unoccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
  - 13. Set each zone to applicable Holiday scheduling for General & Stake Conferences.

#### 3.5 **ADJUSTING**

LCBS controller configuration settings; the following are configuration guidelines for consistent installations:

Temperature Units Fahrenheit/ Celsius Equipment Type Conventional/heat pump.

1,2 a. Stages of Heat Stages of Cool 1.2 b.

Fan operation in heat mode Enable Fan w/ Heat C.

**Equipment Options** 

a. Leave at Default

6-9 cph b. Heating Cycles per Hour Cooling Cycles per Hour 3-4 cph C.

Recovery

Leave at Default a.

5. Economizer / DLC

Configure as required by control equipment.

Sensor Selection 6.

Set according to averaging sensors a.

Set to multi sensor "Smart" when averaging. b.

Set Occupancy Sensor to "Disable".

Terminal Assignment

Set according to equipment

Set Terminal D01 to Occupancy to control fresh air damper based upon scheduled occupancy or over-ride.

Dehumidification

Leave at default a.

See Accessory Loops

Miscellaneous

Leave at default a.

10. Sensor setting

a. Leave at default

b. Set as Required

11. Accessory Loops – Set as required

a. Hot water valve

Dehumidification h

Other

12. Configure Zone Name (display on Home Screen).

13. Set Password to ABCD.

14. Set Occupied Setpoint

15. Set Unoccupied Setpoint

16. Set Schedule

- 17. MENU/ Holiday-Event Scheduler / Custom Events/ Create new event.
  - a. Eastern Time Zone:
    - 1) First Sunday in April: Occupied Chapel from 11:30 am 6:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 11:30 am 6:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.
  - b. Central Time Zone:
    - 1) First Sunday in April: Occupied Chapel from 10:30 am 5:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 10:30 am 5:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.
  - c. Mountain Time Zone:
    - 1) First Sunday in April: Unoccupied all zones for all day / every year.
    - 2) First Sunday in April: Unoccupied all zones for all day / every year.
    - 3) First Sunday in October: Unoccupied all zones for all day / every year.
    - First Sunday in October: Unoccupied all zones for all day / every year.
  - d. Pacific Time Zone
    - 1) First Sunday in April: Occupied Chapel from 8:30 am 3:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 8:30 am 3:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.

# 3.6 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  - 1. Include as part of training required in Section 23 0501, following training:
    - Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
    - b. Provide training in (2) two sessions including LCBS Connect sight & smart Apps for up to six (6) hours total:
      - 1) First session will occur between system completion and Substantial Completion.
      - Second session will occur within forty-five (45) days of Substantial Completion when agreed upon by Owner.
    - c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:
      - Control System Overview:
        - Show access to system through both individual controllers and Internet browser and how network works. Scheduling building at minimum for Stake and General Conference, special events.
      - Controller Programming from Keypad: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
      - 3) Web Internet training with local Facilities Manager during two (2) sessions.
        - Review all features accessible from the 'Settings' tab including Alarm points, user access, scheduling and humidity setpoints (where applied).

END OF SECTION

**ATTACHMENTS** 

# CERTIFICATE OF SPONSORSHIP Electric and Electronic Control System for HVAC Installer

PROJECT INFORMATION (To be filled out by Installer - available from	project specification):
Project Name:	
Project Number:	
Project Address:	
INSTALLER INFORMATION (To be filled out by Installer):	
Installer Name:	
Installer Firm:	
Installer Address:	
I acknowledge and confirm the above listed Installer has received train qualified to install the automation control system as specified for Project Installer meeting the legal specified performance requirements.	
Sponsoring Approved Honeywell Distributor Name:	
Signature: Printed Signature:	
Date:	

# SECTION 23 1123 FACILITY NATURAL-GAS PIPING

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavation and backfill required for work of this Section.
  - Furnish and install gas piping and fittings within building and from building to meter including connection to meter as described in Contract Documents.
- B. Related Requirements:
  - 1. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of exterior piping.
  - 2. Section 23 0501: 'Common HVAC Requirements'.
  - 3. Section 23 0553: 'Identification for HVAC Piping and Equipment'.
  - 4. Section 31 2316: 'Excavation' for procedure and quality of excavation.
  - 5. Section 31 2323: 'Fill" for procedure and quality of backfill and compaction.
  - 6. Section 33 5100: 'Natural-Gas Distribution' for gas line from meter to main.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
    - b. ASTM A234/A234M-11a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
    - c. ASTM D2513-14, 'Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings'.
  - 2. International Code Council (ICC):
    - a. ICC IFGC-2015: 'International Fuel Gas Code'.

# 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Conform to requirements of IFGC International Fuel Gas Code.
- B. Qualifications:
  - 1. Welders:
    - Welders shall be certified and bear evidence of certification thirty (30) days before commencing work on project.
    - b. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.
  - 2. Pipe Installers:
    - a. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Do not store polyethylene pipe so it is exposed to sunlight.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

#### A. Manufacturers:

- 1. Manufacturer Contact List:
  - a. BrassCraft, Novi, MI www.brasscraft.com.
  - b. Cimberio Valve Co Inc, Malvern, PA www.cimberio.com.
  - ConBraCo Industries, Inc, Matthews, NC www.conbraco.com or ConBraCo / Honeywell Ltd, Scarborough, ON (416) 293-8111.
  - d. Dormont Manufacturing Company, Export, PA www.dormont.com.
  - e. Jenkins-NH-Canada, Brantford, ON www.jenkins-nh-canada.com.
  - f. Jomar International, Madison Heights, MI www.jomar.com.
  - g. California Valves (formally KOSO) by Pacific Seismic Products Inc, Lancaster, CA, Distributed by Strand Earthquake Consultants www.strandearthquake.net.
  - h. Viega ProPress, Wichita, KS www.viega-na.com.

#### B. Materials:

- 1. Above-Ground Pipe And Fittings:
  - a. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of A53/A53M.
  - Welded forged steel fittings meeting requirements of ASTM A234/A234M or standard weight malleable iron screwed.
- 2. Below-Ground Pipe And Fittings: Polyethylene pipe and fittings meeting requirements of ASTM D2513 with No. 14 coated copper trace wire.
- Valves:
  - a. 125 psi bronze body ball valve, UL listed.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) CIM 102.1 by Cimbrio Valve.
    - 2) Apollo Series 80-100 by ConBraCo.
    - 3) 'Red Cap' R602 by Jenkins NH Canada.
    - 4) Model T-204 by Jomar International.
    - 5) Model B-6000-UL by Watts Regulator.
- 4. Cocks:
  - a. Gauge Cocks: Conbraco Series 50-56 bronze gauge cock.
- 5. Flexible Connector:
  - a. Type 304 stainless steel corrugated tube coated for corrosion protection.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dormont Supr-Safe.
    - 2) BrassCraft Procoat.
- 6. Seismic Valves:
  - a. Natural gas seismic shut-off valves.
    - Rate at maximum 20 psi pressure with positive seating from minus 40 deg F to plus 150 deg F for exterior mounting near gas meter.
    - 2) UL listed valve, factory set for IBC Seismic Design Category D, E, or F.
    - Size to be determined by total cu ft per hour gas flow requirement of building and following conditions:
       1 inch water column maximum allowable pressure-drop through valve with available pressure of 4 oz.
    - 4) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) California Seismic Gas Shutoff Valve (formally KOSO):
        - (1) Horizontal installation: Model 314F or 315F.
        - (2) Vertical installation with bottom inlet: Model VB314F or VB315F.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Steel pipe installed through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other steel pipe may have screwed, ProPress G, or welded fittings.

- B. Lay underground pipe in accordance with Manufacturer's recommendations and local gas utility company regulations and specifications.
  - 1. Provide 24 inch minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of polyethylene line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
  - 2. Place tracer wire along side of polyethylene pipe from meter to point where pipe rises inside building.
  - 3. Place 4 inches of sand around gas line buried underground.
  - 4. Do not install gas piping under building floor slabs-on-grade.
- C. After gas meter, valves, seismic valve and etc, gas piping should rise inside outside wall and not be visible to public.
- D. On lines serving gas-fired equipment, install gas cocks adjacent to equipment outside of equipment cabinet and easily accessible.
- E. Install 6 inch long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.
- F. Use fittings for changes of direction in pipe and for branch runouts.
- G. Visible gas piping inside building shall be painted yellow and labeled.
- H. Install seismic valve in 24 inch long pipe section anchored to building wall at each end.

## 3.2 FIELD QUALITY CONTROL

- A. Field tests:
  - Subject all portions of gas piping system, in sections or in entirety, to air pressure of 75 psig and prove airtight for four (4) hours.
  - 2. Disconnect equipment not suitable for 75 psig pressure from piping system during test period.

# SECTION 23 2300 REFRIGERANT PIPING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install piping and specialties for refrigeration systems as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 0719: 'Refrigerant Piping Insulation'.
  - 3. Section 23 6214: 'Air Cooled Condensing Units: Air Conditioning (5 Ton or less)'.
  - 4. Section 23 5417: 'Gas Fired Furnaces'.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
    - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
  - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
    - VISCMA 101-15, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
    - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.

# B. Definitions:

- 1. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
- 2. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.

### C. Reference Standards:

- 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
  - a. ANSI/ASHRAE 5-2013 (packaged w/ 34-2013, 'Safety Standard and Designation and Classification of Refrigerants'.
- 2. American National Standards Institute / American Welding Society:
  - a. ANSI/AWS A5.8M/A5.8-2011, 'Specification for Filler Metals for Brazing and Braze Welding'.
- 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
  - a. 2011 ASHRAE Handbook HVAC Applications.
    - 1) Chapter 48, 'Noise and Vibration Control'.
- 4. ASTM International:
  - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
  - b. ASTM B280-13, 'Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service'.
- 5. National Fire Protection Association / American National Standards Institute:
  - a. NFPA 90A-2015, 'Installation of Air Conditioning and Ventilating Systems'.
- 6. Underwriters Laboratories:
  - a. UL 2182, 'Refrigerants' (April 2006).

## 1.3 SUBMITTALS

- A Action Cubmittals
  - 1. Shop Drawings: Show each individual equipment and piping support.

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- B. Informational Submittals:
  - 1. Qualification Statements: Technician certificate for use of HFC and HCFC refrigerants.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Refrigerants:
    - a. Underwriters Laboratories / Underwriters Laboratories of Canada:
      - 1) Comply with requirements of UL 2182.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  - Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

### PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Airtec, Fall River, MA, www.noventcaps.com.
    - b. Cooper Industries, Houston, TX www.cooperindustries.com.
    - c. Cush-A-Clamp by ZSI Manufacturing, Canton, MI www.cushaclamp.com.
    - d. Elkhart Products Corp, Elkhart, IN www.elkhartproducts.com.
    - e. Emerson Climate Technologies, St Louis, MO www.emersonflowcontrols.com.
    - f. Handy & Harman Products Division, Fairfield, CT www.handy-1.com.
    - g. Harris Products Group, Cincinnati, OH www.harrisproductsgroup.com.
    - h. Henry Valve Co, Melrose Park, IL www.henrytech.com.
    - i. Hilti Inc, Tulsa, OK www.hilti.com.
    - j. Hydra-Zorb Co, Auburn Hills, MI www.hydra-zorb.com.
    - k. JB Industries, Aurora, IL www.jbind.com.
    - I. Mueller Steam Specialty, St Pauls, NC www.muellersteam.com.
    - m. Nibco Inc, Elkhart, IN www.nibco.com.
    - n. Packless Industries, Waco, TX www.packless.com.
    - o. Parker Corp, Cleveland, OH www.parker.com.
    - p. Sporlan Valve Co, Washington, MO www.sporlan.com.
    - q. Sherwood Valves, Washington, PA www.sherwoodvalve.com.
    - r. Thomas & Betts, Memphis, TN www.superstrut.com.
    - s. Unistrut, Div of Atkore International, Inc., Harvey, IL www.unistrut.com.
    - t. Universal Metal Hose, Chicago, IL www.universalmetalhose.com.
    - u. Vibration Mountings & Controls, Bloomingdale, NJ www.vmc-kdc.com.
    - v. Virginia KMP Corp, Dallas, TX www.virginiakmp.com.

#### B. Materials:

- Refrigerant Piping:
  - a. Meet requirements of ASTM B280, hard drawn straight lengths. Soft copper tubing not permitted.
  - b. Do not use pre-charged refrigerant lines.
- Refrigerant Fittings:
  - a. Wrought copper with long radius elbows.
  - b. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Mueller Streamline.
    - 2) Nibco Inc.
    - 3) Elkhart.
- 3. Suction Line Traps:
  - a. Manufactured standard one-piece traps.
    - b. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - 1) Mueller Streamline.
      - 2) Nibco Inc.
      - 3) Elkhart.

- 4. Tee Access:
  - a. Brass: 1) (
    - Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) JB Industries: Part #A3 Series with Factory Cap and Valve Core.
- 5. Connection Material:
  - a. Brazing Rods in accordance with ANSI/AWS A5.8M/A5.8:
    - Copper to Copper Connections:
      - a) Classification BCuP-4 Copper Phosphorus (6 percent silver).
      - b) Classification BCuP-5 Copper Phosphorus (15 percent silver).
    - Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
    - 3) Do not use rods containing Cadmium.
  - b. Flux:
    - 1) Type Two Acceptable Products:
      - a) Stay-Silv White Brazing Flux by Harris Products Group.
      - b) High quality silver solder flux by Handy & Harmon.
      - Equal as approved by Architect before use. See Section 01 6200.
- 6. Valves:
  - a. Expansion Valves:
    - For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
    - Size valves to provide full rated capacity of cooling coil served. Coordinate selection with evaporator coil and condensing unit.
    - 3) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) Emerson Climate Technologies.
      - b) Henry.
      - c) Mueller.
      - d) Parker.
      - e) Sporlan.
  - b. Manual Refrigerant Shut-Off Valves:
    - 1) Ball valves designed for refrigeration service and full line size.
    - 2) Valve shall have cap seals.
    - 3) Valves with hand wheels are not acceptable.
    - 4) Provide service valve on each liquid and suction line at compressor.
    - If service valves come as integral part of condensing unit, additional service valves shall not be required.
    - 6) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) Henry.
      - b) Mueller.
      - c) Sherwood.
      - d) Virginia.
- 7. Filter-Drier:
  - a. On lines 3/4 inch outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.
  - b. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type with brazed end connections.
  - c. Size shall be full line size.
  - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Emerson Climate Technologies.
    - 2) Mueller.
    - 3) Parker.
    - 4) Sporlan.
    - 5) Virginia.
- 8. Sight Glass:
  - a. Combination moisture and liquid indicator with protection cap.
  - b. Sight glass shall be full line size.
  - c. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) HMI by Emerson Climate Technologies.
- 9. Flexible Connectors:
  - a. Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Vibration Absorber Model VAF by Packless Industries.

- 2) Vibration Absorbers by Virginia KMP Corp.
- 3) Anaconda 'Vibration Eliminators' by Universal Metal Hose.
- 4) Style 'BF' Spring-flex freon connectors by Vibration Mountings.

#### 10. Refrigerant Piping Supports:

- a. Base, Angles, And Uprights: Steel meeting requirements of ASTM A36.
- b. Securing Channels:
  - 1) At Free-Standing Pipe Support:
    - a) Class One Quality Standard: P-1000 channels by Unistrut.
    - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - c) Equal as approved by Architect before installation. See Section 01 6200.
  - 2) At Wall Support:
    - a) Class One Quality Standard: P-3300 channels by Unistrut.
    - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - c) Equal as approved by Architect before installation. See Section 01 6200.
  - 3) At Suspended Support:
    - a) Class One Quality Standard: P-1001 channels by Unistrut.
    - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - c) Equal as approved by Architect before installation. See Section 01 6200.
  - 4) Angle Fittings:
    - a) Class One Quality Standard: P-2626 90 degree angle by Unistrut.
    - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - c) Equal as approved by Architect before installation. See Section 01 6200.
- c. Pipe Clamps:
  - Type Two Acceptable Manufacturers:
    - a) Hydra-Zorb.
    - b) ZSI Cush-A-Clamp.
    - c) Hilti Cush-A-Clamp.
    - d) Equal as approved by Architect before installation. See Section 01 6200.
- d. Protective Cover: 18 ga steel, hot-dipped galvanized.
- 11. Locking Refrigerant Cap:
  - a. Provide and install on charging valves:
    - 1) Class One Quality Standard: 'No Vent' locking refrigerant cap.
    - 2) Acceptable Manufacturers: Airtec.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Refrigerant Lines:
  - 1. Install as high in upper mechanical areas as possible. Do not install underground or in tunnels.
  - 2. Slope suction lines down toward compressor one inch/10 feet. Locate traps at vertical rises against flow in suction lines.
- B. Connections:
  - Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
  - 2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
  - Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.
- C. Specialties:
  - 1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
  - 2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.
  - Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.
  - 4. Provide flexible connectors in each liquid line and suction line at both condensing unit and evaporator on systems larger than five tons. Anchor pipe near each flexible connector.

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## D. Refrigerant Supports:

- Support Spacing:
  - a. Piping 1-1/4 inch And Larger: 8 feet on center maximum.
  - b. Piping 1-1/8 inch And Smaller: 6 feet on center maximum.
  - c. Support each elbow.
- 2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.
- 3. Run protective cover continuous from condensing units to risers or penetrations at building wall.

#### 3.2 FIELD QUALITY CONTROL

#### A. Field Tests:

- 1. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.
  - a. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
  - b. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
  - c. Conduct tests at 70 deg F ambient temperature minimum.
  - d. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
  - e. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
  - f. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.

## B. Non-Conforming Work:

 If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

END OF SECTION

REFRIGERANT PIPING - 5 - 23 2300

# SECTION 23 2600 CONDENSATE DRAIN PIPING

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Coordinate installation of condensate drain piping with Section 22 0501 as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 23 0501: 'Common HVAC Requirements'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1785-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.

#### PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Materials:
  - 1. Condensate Drains:
    - a. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.
- B. Secondary Drain Pan Overflow Kit:
  - 1. Assembly:
    - a. Inlet Tee (spears)
    - b. Float switch assembly, 24 volt
    - c. 3-wire 48" cable
    - d. Removable plug
    - e. 1-3/4" slip reducer
    - f. 3/4" nesting adapter for close coupled installations
  - 2. Manufacturer subject to
    - a. EZ-Trap Inc. EZT-225 Standard
- C. Secondary Coil Trap:
  - 1. Assembly:
    - a. Inlet Tee (spears)
    - b. 3-wire 48" cable
    - c. Removable plug
    - d. 1-3/4" slip reducer
    - e. 3/4" nesting adapter for close coupled installations
    - f. Float switch
  - 2. Manufacturer
    - a. EZ-Trap Inc. EZT-225 Standard
- D. Primary Coil Trap:
  - 1. Assembly
    - a. Inlet cross
    - b. Clear plastic U-bend
    - c. Drain caps

- 2. Manufacturer
  - EZ-Trap Inc. EZT-119

# PART 3 - EXECUTION

#### 3.1 **INSTALLATION**

- A. Condensate Drains:

  - Support piping and protect from damage.

    Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

# SECTION 23 3001 COMMON DUCT REQUIREMENTS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. General procedures and requirements for ductwork.
  - 2. Repair leaks in ductwork, as identified by duct testing, at no additional cost to Owner.
- B. Related Requirements:
  - 1. Section 01 4546: 'Duct Testing, Adjusting, and Balancing' for ductwork.
  - 2. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustic sealant.
  - 3. Section 23 0501: 'Common HVAC Requirements'.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
    - a. SMACNA, 'HVAC Duct Construction Standards Metal and Flexible' (Third Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

#### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data: Specification data on sealer and gauze proposed for sealing ductwork.
  - 2. Samples: Sealer and gauze proposed for sealing ductwork.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.

### PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Performance:
  - 1. Design Criteria:
    - a. Standard Ducts: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA, 'HVAC Duct Construction Standards Metal and Flexible'.
- B. Materials:
  - Duct Hangers:
    - a. One inch by 18 ga galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches apart. Do not use wire hangers.
    - b. Attaching screws at trusses shall be 2 inch No. 10 round head wood screws. Nails not allowed.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
- B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
- C. Hangers And Supports:
  - 1. Install pair of hangers as required by spacing indicated in table on Drawings.
  - 2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
  - 3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
  - 4. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

## 3.2 CLEANING

A. Clean interior of duct systems before final completion.

# SECTION 23 3114 LOW-PRESSURE METAL DUCTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Duct smoke detectors.
- C. Related Requirements:
  - 1. Section 01 4546: 'Duct Testing, Adjusting, And Balancing' for duct test, balance, and adjust air duct systems services provided by Owner.
  - 2. Section 23 0713: 'Duct Insulation' for thermal Insulation for ducts, plenum chambers, and casings.
  - 3. Section 23 3001: 'Common Duct Requirements'.
  - 4. Section 23 0933: 'Electric And Electronic Control System For HVAC':
    - a. Temperature control damper actuators and actuator linkages.
    - b. Furnishing of duct smoke detectors.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
  - 2. SMACNA, 'HVAC Duct Construction Standards Metal and Flexible' (Third Edition).
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM E84-14, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - 2. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 Tenth Edition).

## 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - Duct Sealer:
    - a. Meet Class A flame spread rating in accordance with ASTM E84 or UL 723.
    - b. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements:
  - Duct Sealer:
    - a. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
    - b. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
    - c. Store in a cool dry location, but never under 35 deg F or subjected to sustained temperatures exceeding 110 deg F or as per Manufacturer's written recommendations.
    - d. Do use sealants that have exceeded shelf life of product.

#### 1.5 FIELD CONDITIONS

- A. Ambient Conditions:
  - Duct Sealer:
    - a. Do not apply under 35 deg F or subjected to sustained temperatures exceeding 110 deg F or as per Manufacturer's written recommendations.
    - b. Do not apply when rain or freezing temperatures will occur within seventy two (72) hours.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

#### A. Materials:

- 1. Sheet Metal:
  - a. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements A653/A653M, with G 60 coating.
- 2. Duct Sealer For Interior Ducts:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Duct Butter or ButterTak by Cain Manufacturing Co Inc, Pelham, AL www.cainmfg.com.
    - 2) DP 1010 or DP 1030 by Design Polymerics, Fountain Valley, CA www.designpoly.com.
    - 3) PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA www.ductmate.com.
    - 4) SAS by Duro Dyne, Bay Shore, NY or Duro Dyne Canada, Lachine, QB www.durodyne.com.
    - 5) Iron Grip 601 by Hardcast Inc, Wylie, TX www.hardcast.com.
    - 6) MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO, www.herculesindustries.com.
    - 7) 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA www.taccint.com.
    - 8) 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
    - 9) Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX www.polymeradhesives.com.
    - 10) Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc, Weatherford, TX www.polymeradhesives.com.

#### B. Fabrication:

- 1. General:
  - a. Straight and smooth on inside with joints neatly finished.
  - b. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct. Seal joints air tight.
- 2. Standard Ducts:
  - a. General:
    - 1) Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
  - b. Round Duct:
    - 1) Spiral Seam:
      - a) 28 ga minimum for ducts up to and including 14 inches in diameter.
      - b) 26 ga minimum for ducts over 14 inches and up to and including 26 inches in diameter.

## PART 3 - EXECUTION

#### 3.1 PREPARATION

A. Metal duct surface must be clean and free of moisture, contamination and foreign matter before applying duct sealer for interior ducts.

### 3.2 INSTALLATION

A. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer as per Manufacturer's written instructions. Cover horizontal and longitudinal joints on exterior ducts with two layers of specified tape installed with specified adhesive.

- B. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.
- C. Ducts shall not bear on top of structural members.
- D. Paint ductwork visible through registers, grilles, and diffusers flat black.
- E. Properly flash where ducts protrude above roof.
- F. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

## 3.3 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Air Test and Balance Testing as specified in Section 01 4546: 'Duct Testing, Adjusting, and Balancing'.
- B. Non-Conforming Work:
  - Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures at no additional cost to Owner.

# SECTION 23 3300 AIR DUCT ACCESSORIES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.

## B. Related Requirements:

- Section 23 0933: 'Electric And Electronic Control System For HVAC' for temperature control damper actuators and actuator linkages.
- 2. Section 23 3001: Common Duct Requirements'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM C1071-12, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)'.
    - c. ASTM C1338-14, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.

### PART 2 - PRODUCTS

### 2.1 ACCESSORIES

#### A. Manufacturers:

- 1. Manufacturer Contact List:
  - a. AGM Industries, Brockton, MA www.agmind.com.
  - b. Air Balance Inc, Holland, OH www.airbalance.com.
  - c. Air Filters Inc, Baltimore, MD www.afinc.com.
  - d. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
  - e. American Warming & Ventilating, Holland, OH www.american-warming.com.
  - f. Arrow United Industries, Wyalusing, PA www.arrowunited.com.
  - g. Cain Manufacturing Company Inc, Pelham, AL www.cainmfg.com.
  - h. C & S Air Products, Fort Worth, TX www.csairproducts.com.
  - i. CertainTeed Corp, Valley Forge, PA www.certainteed.com.
  - j. Cesco Products, Florence, KY www.cescoproducts.com.
  - k. Daniel Manufacturing, Ogden, UT (801) 622-5924.
  - I. Design Polymerics, Fountain Valley, CA www.designpoly.com.
  - m. Ductmate Industries Inc, East Charleroi, PA www.ductmate.com.
  - n. Duro Dyne, Bay Shore, NY www.durodyne.com.
  - o. Dyn Air Inc. Lachine, QB www.dynair.ca
  - p. Elgen Manufacturing Company, Inc. East Rutherford, NJ www.elgenmfg.com
  - q. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com.
  - r. Greenheck Corp, Schofield, WI www.greenheck.com.
  - s. Gripnail Corp, East Providence, RI www.gripnail.com.
  - t. Hardcast Inc, Wylie, TX www.hardcast.com.
  - u. Hercules Industries, Denver, CO, www.herculesindustries.com.
  - v. Honeywell Inc, Minneapolis, MN www.honeywell.com.
  - w. Industrial Acoustics Co, Bronx, NY www.industrialacoustics.com.
  - x. Johns-Manville, Denver, CO www.jm.com.

- y. Kees Inc, Elkhart Lake, WI www.kees.com.
- z. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com.
- aa. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
- bb. Metco Inc, Salt Lake City, UT (801) 467-1572 www.metcospiral.com.
- cc. Miracle / Kingco, Rockland, MA www.taccint.com.
- dd. Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
- ee. Nailor Industries Inc, Houston, TX www.nailor.com.
- ff. Owens Corning, Toledo, OH www.owenscorning.com.
- gg. Polymer Adhesive Sealant Systems Inc, Irving, TX www.polymeradhesives.com.
- hh. Pottorff Company, Fort Worth, TX www.pottorff.com.
- ii. Ruskin Manufacturing, Kansas City, MO www.ruskin.com.
- ij. Sheet Metal Connectors Inc, Minneapolis, MN www.smconnectors.com.
- kk. Tamco, Stittsville, ON www.tamco.ca.
- II. Techno Adhesive, Cincinnati, OH www.technoadhesives.com.
- mm. Titus, Richardson, TX (972) 699-1030. www.titus-hvac.com
- nn. McGill AirSeal, Columbus, OH www.mcgillairseal.com.
- oo. United Enertech Corp, Chattanooga, TN www.unitedenertech.com.
- pp. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- qq. Ventfabrics Inc, Chicago, IL www.ventfabrics.com.
- rr. Ward Industries, Grand Rapids MI www.wardind.com.
- ss. Young Regulator Co, Cleveland, OH www.youngregulator.com.

### B. Materials:

- 1. Acoustical Liner System:
  - a. Duct Liner:
    - One inch thick, 1-1/2 lb density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) ToughGard by CertainTeed.
      - b) Duct Liner E-M by Knauf Fiber Glass.
      - c) Akousti-Liner by Manson Insulation.
      - d) Quiet R by Owens Corning.
      - e) Linacoustic RC by Johns-Manville.
  - b. Adhesive:
    - 1) Category Four Approved Water-Based Products. See Section 01 6200 for definitions of Categories:
      - a) Cain: Hydrotak.
      - b) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
      - c) Duro Dyne: WSA.
      - d) Elgen: A-410-WB.
      - e) Hardcast: Coil-Tack.
      - f) Hercules: Mighty Tough Adhesives MTA500 or MTA600.
      - g) Miracle / Kingco: PF-101.
      - h) Mon-Eco: 22-67 or 22-76.
      - i) Polymer Adhesive: Glasstack #35.
      - j) Techno Adhesive: 133.
      - k) McGill AirSeal: Uni-tack.
    - Category Four Approved Solvent-Based (non-flammable) Products. See Section 01 6200 for definitions of Categories:
      - a) Cain: Safetak.
      - b) Duro Dyne: FPG.
      - c) Hardcast: Glas-Grip 648-NFSE.
      - d) Miracle / Kingco: PF-91.
      - e) Mon-Eco: 22-24.
      - f) Polymer Adhesive: Q-Tack.
      - g) Techno Adhesive: 'Non-Flam' 106.
    - Category Four Approved Solvent-Based (flammable) Products. See Section 01 6200 for definitions of Categories:
      - a) Cain: HV200.
      - b) Duro Dyne: MPG.
      - c) Hardcast: Glas-Grip 636-SE.
      - d) Miracle / Kingco: PF-96.
      - e) Mon-Eco: 22-22.
      - f) Polymer Adhesive: R-Tack.

- g) Techno Adhesive: 'Flammable' 106.
- c. Fasteners:
  - 1) Adhesively secured fasteners not allowed.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - ) AGM Industries: 'DynaPoint' Series RP-9 pin.
    - b) Cain.
    - c) Duro Dyne.
    - d) Gripnail: May be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.
- 2. Flexible Equipment Connections:
  - a. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
  - b. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 200 deg F.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cain: N-100.
    - 2) Duro Dyne: MFN.
    - 3) Dyn Air: CPN with G-90 galvanized off-set seam.
    - 4) Elgen: ZLN / SDN.
    - 5) Ventfabrics: Ventglas.
    - 6) Ductmate: ProFlex.
- 3. Duct Access Doors:
  - General:
    - 1) Factory built insulated access door with hinges and sash locks, as necessary. Construction shall be galvanized sheet metal, 24 ga minimum.
    - Fire and smoke damper access doors shall have minimum clear opening of 12 inches square or larger as shown on Drawings.
  - b. Rectangular Ducts:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Air Balance: Fire/Seal FSA 100.
      - b) Air-Rite: Model HAD-2.
      - c) Cesco: HDD.
      - d) Elgen: TAB Type / Hinge and Cam.
      - e) Flexmaster: Spin Door.
      - f) Kees: ADH-D.
      - g) Nailor: 08SH.
      - h) Pottorff: 60-HAD.
      - i) Ruskin: ADH-24.
      - j) United Enertech: L-95.
  - c. Round Ducts:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Ductmate: 'Sandwich' Access Door.
      - b) Elgen: Sandwich Access Door.
      - c) Kees: ADL-R.
      - d) Nailor: 0809.
      - e) Pottorff: RAD.
      - f) Ruskin: ADR.
      - g) Ward: DSA.
- 4. Dampers And Damper Accessories:
  - a. Locking Quadrant Damper Regulators:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Duro Dyne: KS-385.
      - b) Dyn Air: QPS-385.
      - c) Elgen: EQR-4.
      - d) Ventfabrics: Ventline 555.
      - e) Young: No. 1.
  - b. Concealed Ceiling Damper Regulators:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Cain.
      - b) Duro Dyne.
      - c) Elgen.
      - d) Metco Inc.
      - e) Ventfabrics: 666 Ventlok.
      - f) Young: 301.

- c. Volume Dampers:
  - Rectangular Duct:
    - a) Factory-manufactured 16 ga galvanized steel, single blade and opposed blade type with 3/8 inch axles and end bearings. Blade width 8 inches maximum. Blades shall have 1/8 inch clearance all around.
    - b) Damper shall operate within acoustical duct liner.
    - c) Provide channel spacer equal to thickness of duct liner.
    - d) Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
    - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air-Rite: Model CD-2.
      - (2) American Warming: VC-2-AA.
      - (3) Arrow: OBDAF-207.
      - (4) C & S: AC40.
      - (5) Cesco: AGO.
      - (6) Daniel: CD-OB.
      - (7) Greenheck: VCD-20.
      - (8) Nailor: 1810 or 1820.
      - (9) Pottorff: CD-42.
      - (10) Ruskin: MD-35.
      - (11) United Enertech: MD-115.
      - (12) Utemp: CD-OB.
  - 2) Round Duct:
    - Factory-manufactured 20 ga galvanized steel, single blade with 3/8 inch axles and end bearings.
    - For use in outside air ducts.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air Balance: Model AC-22.
      - (2) Air-Rite: Model CD-8.
      - (3) American Warming: V-22.
      - (4) Arrow: Type-70.
      - (5) C & S: AC21R.
      - (6) Cesco: MGG.
      - (7) Nailor: 1890.
      - (8) Pottorff: CD-21R.
      - (9) Ruskin: MDRS-25.
      - (10) United Enertech: RD.
- d. Motorized Outside Air Dampers:
  - 1) General:
    - a) Low leakage type. AMCA certified.
    - b) Make provision for damper actuators and actuator linkages to be mounted external of air flow.
  - 2) Rectangular Ducts:
    - a) Damper Blades:
      - (1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch blade width maximum measured perpendicular to axis of damper.
      - (2) Jamb seals shall be flexible metal compression type.
      - Opposed or single blade type.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - Air Balance: AC 526.
      - (2) American Warming: AC526.
      - (3) Arrow: AFD-20.
      - (4) C & S: AC50.
      - (5) Cesco: AGO3.
      - (6) Nailor: 2020.
      - (7) Pottorff: CD-52.
      - (8) Ruskin: CD-60.
      - (9) Tamco: Series 1000.
      - (10) United Enertech: CD-150 or CD-160.
  - 3) Round Ducts:
    - a) Damper Blades:
      - (1) Steel with mechanically locked blade seals.
      - (2) Blade seals shall be neoprene or polyethylene.
      - (3) Single blade type.

- b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - (1) Air Balance: AC 25.
  - (2) American Warming: VC25.
  - (3) Arrow: Type 70 or 75.
  - (4) C & S: AC25R.
  - (5) Cesco: AGG.
  - (6) Nailor: 1090.
  - (7) Pottorff: CD-25R.
  - (8) Ruskin: CD25.
  - (9) Tamco: Square-to-Round Series 1000.
  - (10) United Enertech: RI.
- e. Backdraft Dampers:
  - 1) Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
  - 2) Stop shall be galvanized steel screen or expanded metal, 1/2 inch mesh.
  - 3) Frame shall be galvanized steel or extruded aluminum alloy.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Air-Rite: Model BDD-3.
    - b) American Warming: BD-15.
    - c) C & S: BD30.
    - d) Pottorff: BD-51.
    - e) Ruskin: NMS2.
    - ) Utemp: BFEA.
- 5. Air Turns:
  - a. Single thickness vanes. Double thickness vanes not acceptable.
  - b. 4-1/2 inch wide vane rail. Junior vane rail not acceptable.
- 6. Branch Tap for Flexible Ductwork:
  - Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga zinc-coated lockforming quality steel sheets meeting requirements of ASTM A653, with G-90 coating.
  - b. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
  - c. Manual Volume Damper:
    - 1) Single blade, 22 ga minimum
    - 2) 3/8 inch minimum square rod with brass damper bearings at each end.
    - 3) Heavy-duty locking quadrant on 1-1/2 inch high stand-off mounting bracket attached to side of round duct.
  - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) ST-1HD by Air-Rite:
      - a) Nylon damper bearings approved for Air-Rite.
    - 2) STO by Flexmaster.
    - 3) HET by Sheet Metal Connectors.

#### C. Fabrication:

- 1. Duct Liner:
  - a. Install mat finish surface on airstream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
  - b. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
  - c. Coat longitudinal and transverse edges of liner with adhesive.
- 2. Air Turns:
  - a. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
  - b. Quiet and free from vibration when system is in operation.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Duct Liner:
  - 1. Furnish and install acoustic lining in following types of rectangular ducts unless noted otherwise on Contract Documents:
    - a. Supply air.
    - b. Return air.
    - c. Mixed air.
    - d. Transfer air.
    - e. Relief air.
    - f. Exhaust air.
    - g. Elbows, fittings, and diffuser drops greater than 12 inches in length.
  - 2. Do not install acoustic lining in round ducts.
- B. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.
- C. Access Doors In Ducts:
  - 1. Install at each manual outside air damper and at each motorized damper. Locate doors within 6 inches of installed dampers.
  - 2. Install within 6 inches of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.
- D. Dampers And Damper Accessories:
  - 1. Install concealed ceiling damper regulators.
    - a. Paint cover plates to match ceiling tile.
    - b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms
  - 2. Provide each take-off with an adjustable volume damper to balance that branch.
    - a. Anchor dampers securely to duct.
    - b. Install dampers in main ducts within insulation.
    - c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
    - d. Where concealed ceiling damper regulators are installed, provide cover plate.
  - 3. Install motorized dampers.

# SECTION 23 3346 FLEXIBLE DUCTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: Common Duct Requirements.

#### 1.2 REFERENCES

- A. Reference Standards:
  - National Fire Protection Association / American National Standards Institute:
    - a. NFPA 90A: 'Standard for the Installation of Air-Conditioning and Ventilating Systems' (2012 Edition).
  - Underwriters Laboratories:
    - a. UL 181, 'Factory-Made Ducts and Air Connectors' (10th Edition).
    - b. UL 181B, 'Closure Systems for Use With Flexible Air Ducts and Air Connectors' (3rd Edition).

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. JP Lamborn Co., Fresno CA www.jplflex.com.
    - b. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com or Flexmaster Canada Ltd, Richmond Hill, ON (905) 731-9411.
    - c. Thermaflex by Flexible Technologies, Abbeville, SC or Mississauga, ON www.thermaflex.net.

### B. Materials:

- 1. Ducts:
  - a. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict airflow after bending.
  - b. Insulation:
    - Nominal 1-1/2 inches, 3/4 lb per cu ft density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
  - c. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
  - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) PR-25 by JP Lambornes.
    - 2) Flex-Vent KP by Thermaflex by Flexible Technologies.
    - 3) Type 1B Insulated by Flexmaster.
- 2. Cinch Bands: Nylon, 3/8 inch removable and reusable type.
  - a. Listed and labeled in accordance with Standard UL 181B and labeled 'UL 181 B-C'.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install duct in fully extended condition free of sags and kinks, using 72 inch maximum lengths.

FLEXIBLE DUCTS - 1 - 23 3346

B. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with specified cinch bands.

END OF SECTION

FLEXIBLE DUCTS - 2 - 23 3346

# SECTION 23 3401 EXHAUST FANS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install exhaust fans as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.
  - 2. Division 26: Control device and electrical connection.

## 1.2 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Bear AMCA seal and UL label.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Acme Engineering & Manufacturing Corp, Muskogee, OK www.acmefan.com.
  - 2. Broan-Nu Tone LLC, Harford, WI www.broan.com.
  - 3. Carnes Co., Verona, MI www.carnes.com.
  - 4. Loren Cook Co., Springfield, MO www.lorencook.com.
  - 5. Soler & Palau (S&P USA Ventilation Systems, LLC), Jacksonville FL www.solerpalau-usa.com.

## 2.2 MANUFACTURED UNITS

- A. Ceiling Mounted Exhaust Fans:
  - Acoustically insulated housings. Sound level rating of 5.0 sones maximum for CFM and static pressure listed on Contract Drawings.
  - 2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
  - 3. True centrifugal wheels.
  - 4. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.
  - 5. Suitably ground motors and mount on rubber-in shear vibration isolators.
  - 6. Provide wall or roof cap, as required.
  - 7. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Acme: VQ.
    - b. Broan: LoSone.
    - c. Carnes: VCD.
    - d. Cook: Gemini.
    - e. Soler & Palau: FF.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Anchor fan units securely to structure or to curb.

END OF SECTION

EXHAUST FANS - 2 - 23 3401

# SECTION 23 3713 DIFFUSERS, REGISTERS, AND GRILLES

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install diffusers, registers, and grilles connected to ductwork as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'General Duct Requirements'.

#### 1.2 SUBMITTALS

- A. Maintenance Material Submittals:
  - 1. Tools: Leave tool for removing core of each different type of grille for building custodian.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Carnes Co, Verona, MI www.carnes.com.
  - 2. J & J Register, Grand Rapids, MI www.jandjreg.com.
  - 3. Krueger Air System Components, Richardson, TX www.krueger-hvac.com.
  - 4. Metal\*Aire by Metal Industries Inc, Clearwater, FL www.metalaire.com.
  - 5. Nailor Industries Inc, Houston, TX or Weston, ON www.nailor.com.
  - 6. Price Industries Inc, Suwanee, GA www.price-hvac.com or E H Price Ltd, Winnipeg, MB (204) 669-4220.
  - 7. Titus, Richardson, TX www.titus-hvac.com.
  - 8. Tuttle & Bailey, Richardson, TX www.tuttleandbailey.com.

## 2.2 MANUFACTURED UNITS

- A. Lay-In Ceiling Diffusers:
  - 1. Finish: Off-white baked enamel.
  - 2. Removable inner core assembly.
  - 3. Performance Standard: Titus TMSA Border Type 3.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes.
    - b. Krueger.
    - c. Metal\*Aire.
    - d. Nailor.
    - e. Price.
    - f. Titus.
    - g. Tuttle & Bailey.
- B. Lay-In Perforated Ceiling Return Grilles:
  - 1. Finish: White baked enamel.
  - 2. Hinged filter access door.
  - 3. Performance Standard: Titus 8FF.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes.
    - b. Krueger.
    - c. Metal\*Aire.

- d. Nailor.
- e. Price.
- f. Titus.

#### C. Tuttle & Bailey. Ceiling Return And Transfer Grilles:

- 1. Finish: Off-white baked enamel.
- 2. 1/2 inch spacing.
- 3. See Contract Documents for location of filter grilles.
- 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Carnes: RSLA.
  - b. J & J: S90H.
  - c. Krueger: S85H.
  - d. Metal\*Aire: SRH.
  - e. Nailor: 6155H.
  - f. Price: 535.
  - g. Titus: 355RL or 355 RS.
  - h. Tuttle & Bailey: T75D.

## D. Side Wall Supply Grilles And Registers:

- 1. Finish: Off-white baked enamel.
- 2. Removable core.
- 3. Double deflection.
- 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Krueger: 5815.
  - b. Metal\*Aire: 42C.
  - c. Nailor: 51RCD.
  - d. Price: RCG-DVS.
  - e. Titus: 1707.
  - f. Tuttle & Bailey: AVF.

## E. Low Sidewall Return Grilles:

- 1. Finish: Off-white baked enamel.
- 2. 38 or 45 degree deflection.
- 3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Carnes: RSHA.
  - b. J & J: S-590.
  - c. Krueger: S480H.
  - d. Metal\*Aire: HD-RH.
  - e. Nailor: 6145H-HD.
  - f. Price: 91.
  - g. Titus: 33RL or 33RS.
  - h. Tuttle & Bailey: T115D.

## F. Ceiling Diffusers:

- 1. Finish: Off-white baked enamel.
- 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Carnes: SKSA.
  - b. J & J: R-1400.
  - c. Krueger: SH.
  - d. Metal\*Aire: 5500S.
  - e. Nailor: 6500B.
  - f. Price: SMD-6.
  - g. Titus: TDC-6.
  - h. Tuttle & Bailey: M.

## G. Soffit Grilles:

- 1. Finish: Baked enamel. Match soffit color.
- 2. Aluminum with aluminum mesh insect screen.
- 3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Carnes: RAAA.
  - b. J & J: ALS95H.
  - c. Krueger: S585H.
  - d. Metal\*Aire: RHE.

e. Nailor: 5155-IS.f. Price: 635.g. Titus: 355FL.

h. Tuttle & Bailey: A75D.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side. Level floor registers and anchor securely into floor.

# 3.2 ADJUSTING

A. Set sidewall supply register blades at 15 degrees upward deflection.

# SECTION 23 3714 LOUVERS AND VENTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install louvers connected to ductwork as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Architectural louvers not connected to ductwork.
- C. Related Requirements:
  - Section 06 2001: 'Common Finish Carpentry Requirements' for installation of architectural louvers not connected to ductwork.
  - 2. Section 23 3001: 'General Duct Requirements'.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Airolite Co, Marietta, OH www.airolite.com.
  - 2. Air-Rite Manufacturing, Bountiful, UT www.air-ritemfg.com.
  - 3. American Warming & Ventilating, Holland, OH www.awv.com.
  - 4. Arrow United Industries, Wyalusing, PA www.arrowunited.com.
  - 5. Carnes Co, Verona, WI www.carnes.com or Energy Technology Products LTD, Edmonton, AB (780) 468-1110.
  - Industrial Louvers Inc, Delano, MN www.industriallouvers.com or DKG Construction, LTD., Waterdown, ON 289-895-9729.
  - 7. Pottorff, Fort Worth, TX www.pottorff.com.
  - 8. Ruskin Manufacturing, Kansas City. MO www.ruskin.com.
  - 9. United Enertech Corporation, Chattanooga, TN www.unitedenertech.com.
  - 10. Vent Products Co Inc, Chicago, IL www.ventprod.com.
  - 11. SF435 by Western Ventilation Products Ltd, Calgary, AB www.westvent.com.
  - 12. Wonder Metals Corp, Redding, CA www.wondermetals.com.

### 2.2 MANUFACTURED UNITS

- A. Louvers:
  - 1. General:
    - a. Extruded aluminum, with blades welded or screwed into frames.
    - b. Frames shall have mitered corners.
    - c. Louvers shall be recessed, flanged, stationary, or removable as noted on Contract Documents.
    - d. Finish
      - Polyvinyledene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
      - 2) Color as selected by Architect from Manufacturer's standard colors.
  - Louvers Connected To Ductwork:
    - a. 1/2 inch mesh 16 ga aluminum bird screen.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) K638 by Airolite.
      - 2) LE-1 by Air-Rite Manufacturing.
      - 3) LE48 by American Warming & Ventilating.
      - 4) EA-405 by Arrow United Industries.

- 5) FKDA by Carnes.
- 6) 455-XP by Industrial Louvers.
- 7) EFK-445 by Pottorff.
- 8) ELF81S30 by Ruskin.
- 9) EL-4 by United Enertech.
- 10) 2740-31 by Vent Products.
- 11) EX by Wonder Metals.
- 3. Architectural Louvers:
  - a. Aluminum bug screen.
  - b. Class One Quality Standards:
    - 1) T608 by Airolite.
    - 2) LE57 by American Warming & Ventilating.
    - 3) EFJ-245 by Pottorff.
    - 4) EL-2 by United Enertech.
    - 5) Equals by Arrow United Industries, Carnes, or Industrial Louvers as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Anchor securely into openings.
- B. Where louvers touch masonry or dissimilar metals, protect with heavy coat of asphaltum paint.

END OF SECTION

LOUVERS AND VENTS - 2 - 23 3714

23 3723

# SECTION 23 3723 HVAC GRAVITY VENTILATORS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install roof vents as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturer List:
  - 1. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
  - 2. Breidert Air Products, Jacksonville, FL www.breidert.com.
  - 3. Carnes Company, Verona, WI www.carnes.com.
  - 4. Greenheck Fan Corporation, Schofield, WI www.greenheck.com.
  - 5. Loren Cook Co, Springfield, MO www.lorencook.com.
  - 6. United Enertech Corporation, Chattanooga, TN www.unitedenertech.com.
  - 7. Vent Products Co, Inc, Chicago, IL www.ventprod.com.

## 2.2 MANUFACTURED UNITS

- A. Louvered Penthouses:
  - 1. Fabricated from 0.081 inch extruded aluminum.
    - a. All welded construction.
    - b. Screws or rivets will not be allowed.
  - 2. Blades:
    - a. Horizontal at 45 degree angle with return bends at upper edges.
    - b. Welded, mitered corners for continuous blade effect.
  - 3. Bird Screens: 1/2 inch square mesh 16 ga aluminum in extruded aluminum, rewirable frames on interior of louvers.
  - 4. Penthouse Finish: Clear anodized aluminum.
  - 5. Curbs:
    - a. Galvanized steel, insulated, factory-fabricated curb.
    - b. Insulation: Minimum 1-1/2 inches thick, 3 lb 48 kg per cubic m density fiber glass.
    - c. Curb Extension: 8 inches above finished roof level.
  - 6. Provide automatic back draft damper on Relief Air Penthouses. Provide motorized damper where indicated on Drawings.
  - 7. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Air-Rite Manufacturing: Model LPE-1.
    - b. Breidert: Model RLX.
    - c. Carnes: GLAB.
    - d. Cook: Type TRE.
    - e. Greenheck: WIH/WRH.
    - f. United Enertech: Model PEL-4.
    - g. Vent Products: Model 7100.

PART 3 - EXECUTION: Not Used

# SECTION 23 4100 AIR FILTERS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install filters used in mechanical equipment.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURED UNITS

- A. Furnace Filters: One inch thick throw-away type as recommended by Furnace Manufacturer.
- B. Do not use pleated filters.
- C. Energy Recovery Units:
  - 1. Two inch thick pleated throw-away type as recommended by Energy Recovery Unit Manufacturer with ANSI/ASHRAE 52.2 MERV rating of 6 or higher.

### PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Provide ample access for filter removal.

## 3.2 FIELD QUALITY CONTROL

A. Inspection: At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

# SECTION 23 5135 AIR PIPING

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install heating equipment exhaust piping and combustion air intake piping as described in Contract Documents.
- B. Related Requirements:
  - Section 07 6310: 'Steep Slope Roof Flashing: Asphalt Tile' for pipe flashing used on steep slope asphalt tile roofs only.
  - 2. Sections Under 09 9000 Heading: Painting.
  - 3. Section 22 3413: 'Instantaneous, Tankless, Gas Domestic Water Heaters'.
  - 4. Section 23 0501: 'Common HVAC Requirements'.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'
    - ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - d. ASTM D2665-14, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Materials:
  - 1. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
  - 2. Piping Primer And Cement:
    - a. Meet requirements of ASTM D2564.

### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Installation For Condensing Furnaces:
  - 1. Run individual vent and individual combustion intake piping from each furnace to concentric roof termination kit provided by Furnace Manufacturer. Slope lines downward toward furnace.
  - 2. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
  - 3. Use concentric roof termination kit provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
  - 4. Attach factory-supplied neoprene coupling to combustion-air inlet connection and secure with clamp.
  - 5. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.
  - 6. York Furnaces: Install air piping on side of furnace in horizontal or vertical installation.

- B. Installation For Condensing Water Heaters:
  - 1. Run individual vent and individual combustion intake piping from each water heater to roof termination as recommended by Water Heater Manufacturer. Concentric roof termination kit may be used if approved by and provided by Water Heater Manufacturer. Slope lines downward toward water heater.
  - 2. Slope combustion chamber exhaust drain downward to floor drain.

## C. Support:

- Support concentric roof termination kit at ceiling or roof line with 20 ga sheet metal straps as detailed on Drawings.
- 2. Support horizontal and sloping sections of pipe with 1 inch wide 20 ga galvanized steel straps. Anchor securely to structure, not allowing pipe to sway.

#### D. Insulation:

- 1. General:
  - a. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
  - b. Slip insulation on piping before piping sections and fittings are assembled keeping slitting of insulation to a minimum.
  - c. Joints:
    - 1) Place 'slit' joint seams of insulation exposed outside building on bottom of pipe.
    - 2) Stagger joints on layered insulation.
    - 3) Seal joints in insulation.
  - d. Paint exterior exposed insulation with two coats of finish recommended by Insulation Manufacturer, color selected by Architect.
- 2. Install specified insulation on PVC air piping serving mechanical equipment as follows
  - a. Combustion air PVC piping in truss space and in attic.
  - b. Combustion vent PVC piping in attic, in truss space, and above roof.
  - c. Insulate fittings with sheet insulation and as recommended by Manufacturer.

**END OF SECTION** 

AIR PIPING - 2 - 23 5135

# SECTION 23 5417 GAS-FIRED FURNACES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install horizontal/vertical gas-fired condensing furnaces as described in Contract Documents.
- B. Related Sections:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 1123: 'Facility Natural Gas Piping'.
  - 3. Section 23 2300: 'Refrigerant Piping'.
  - 4. Section 23 4100: 'Air Filters'.
  - 5. Section 23 5135: 'Air Piping'.
  - 6. Section 23 6214: 'Air Cooled Condensing Units: Air Conditioning (5 Ton or less)' for DX Cooling.

## 1.2 SUBMITTALS

- A. Informational Submittals:
  - 1. Manufacturer Reports: Equipment check-out sheets.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Equipment checkout sheet: Complete and sign all items for each unit.

## 1.3 WARRANTY

- A. Manufacturer's Warranty:
  - 1. Provide Manufacturer's Special LDS Warranty for the following:
    - a. Provide fifteen (15) year minimum limited warranty of heat exchanger and five (5) year limited warranty on parts.

## PART 2 - PRODUCTS

# 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Carrier Corporation:
      - 1) Carrier National: Bradley Brunner (270) 282-1241 Bradley.M.Brunner@Carier.utc.com.
      - 2) Carrier Utah: Rich Carpenter (Contractors HVAC Supply) (801) 410-6077 e-mail rcarpent@mtncom.net.
    - b. Lennox Industries:
      - 1) For pricing and information contact Lennox National Account @ 1-800-367-6285.
      - 2) Lennox National Contact: Cody Jackson (801) 736-8904 Cody.Jackson@LennoxInd.com.
    - c. York International:
      - 1) Brian Michael (405) 419-6230 brian.k.michael@jci.com.

- B. Design Criteria:
  - Rated at 92 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.

#### C. Manufactured Units:

- 1. Furnaces:
  - Factory assembled units certified by AGA complete with blower section, furnace section, steel casing, piped, and wired.
  - b. Blower section shall consist of cabinet, blower, and motor.
    - 1) Cabinet shall be of 22 ga minimum cold rolled steel and have finish coat of baked-on enamel.
    - 2) Blower shall be Class 1, full DIDW, statically and dynamically balanced.
  - c. Automatic controls shall consist of:
    - 1) Manual gas shut-off valve.
    - 2) Operating automatic gas valve.
    - 3) Solid-state type fan and thermal limit controls.
    - 4) 24-volt transformer.
    - 5) Hot surface ignition system.
  - d. Blower shall be driven by multi-speed direct driven motor.
  - e. Furnace section shall be enclosed in 22 ga minimum enameled steel casing lined with foil covered insulation.
  - f. Heat Exchanger: Aluminized steel.
  - g. Gas Burners: Aluminized steel.
  - h. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
  - i. Concentric roof termination kit for roof mounting.
  - j. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Standard Furnaces:
      - a) Carrier: 59SC5A.
      - b) Lennox: ML195.
      - c) York: TG9S.
    - 2) Two Stage Heat with ECM motor:
      - a) Carrier: 59TN6.
      - b) Lennox: EL296V.
      - c) York: TM9V.
- 2. Cooling Coil:
  - Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace:
    - 1) Coil shall have aluminum fins bonded to seamless copper or aluminum tubing.
    - 2) Coil shall be ARI rated. Provide drain pans with connections at one end.
    - 3) Use thermal expansion valve.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Horizontal:
      - a) Carrier: CNPHP.
      - b) Lennox: CH33.
      - c) York: MC.
    - 2) Vertical:
      - a) Carrier: CNPVP.
      - b) Lennox: CX34.
      - c) York: FC.

#### 2.2 ACCESSORIES

- A. Filter Frame:
  - 1. Build filter frame external to furnace as detailed on Contract Drawings.
- B. Vibration Isolators:
  - 1. Horizontal Installation:
    - a. Neoprene hanger type with load of 75 lbs maximum.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) RH by Kinetics Noise Control, Dublin, OH www.kineticsnoise.com.
      - 2) Mason Industries, Hauppage, NY www.mason-ind.com.
      - 3) RH by Vibration Mounting & Controls, Bloomingdale, NJ www.vmc-kdc.com.
  - 2. Vertical Installation: 4 inches square by 1/2 inch thick minimum neoprene type vibration isolation pads.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Vibration Isolators:
  - Install vibration isolator on each hanger rod supporting horizontal furnace and under each corner of vertical furnace.

# 3.2 FIELD QUALITY CONTROL

- A. Manufacturer Services:
  - 1. Furnace installer shall:
    - a. Verify proper gas orifice size.
      - b. Clock gas meter for rated input.
      - c. Verify and set gas pressure at furnace.
      - d. Check and measure temperature rise.
      - e. Check safety controls for proper operation.
      - f. Check combustion vent sizes and combustion air sizes.
  - 2. In addition, furnace installer shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION

GAS-FIRED FURNACES - 3 - 23 5417

# SECTION 23 6214 AIR COOLED CONDENSING UNITS: Air Conditioning (5 Ton or less)

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install condensing units as described in contract documents.

## B. Related Sections:

- Section 06 2001: 'Common Finish Carpentry Requirements' for blocking at roof mounted compressor unit curb locations.
- 2. Sections under Heading 07 5000 Membrane Roofing.
- 3. Section 23 0501: 'Common HVAC Requirements'.
- 4. Section 23 2300: 'Refrigerant Piping'.
- 5. Section 23 5417: 'Gas-Fired Furnaces'.

## 1.2 REFERENCES

## A. Definitions:

- 1. Compressor: Pump that increases vapor (refrigerant or air) pressure from one level to a higher level of pressure.
- 2. Condensing Unit: Outside section of an air conditioning system which pumps vaporized refrigerant from the evaporator, compresses it, liquefies it in the condenser and returns it to the evaporator coil. The outdoor portion of a split system air conditioner contains the compressor and outdoor coil.
- 3. Condenser: Device used to condense refrigerant in a cooling system.
- 4. Condenser Coils: In a compressor unit, the coil dissipates heat from the refrigerant, changing the refrigerant from vapor to liquid.
- 5. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
- 6. SEER (Seasonal Energy Efficiency Ratio): Measure of cooling efficiency for air conditioners and heat pumps. A ratio of total cooling in comparison to electrical energy input in watts per hour. Higher the seer, the more energy efficient the unit. Since 2006, the minimum SEER required by the Department of Energy is 13.00 and 15.00+ SEER is considered high efficiency.
- 7. Split System: Combination of an outdoor unit (air conditioner or heat pump) with an indoor unit (furnace or air handler). Split systems must be matched for optimum efficiency.

## B. Reference Standards:

- 1. American National Standards Institute / Air-Conditioning, Heating, and Refrigeration Institute:
  - a. ANSI/AHRI Standard 210/240-2008, 'Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment' (formerly ARI Standard 210/240).
- American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers:
  - a. ANSI/ASHRAE Standard 15-2010, 'Safety Standard for Refrigeration Systems'.
  - b. ANSI/ASHRAE Standard 34-2010, 'Designation and Classification of Refrigerants'.
- 3. ASTM International:
  - ASTM A615/A615M-14, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
  - b. ASTM C920-14, 'Standard Specification for Elastomeric Joint Sealants'.
- 4. CSA Group (Canadian Standards Association):
  - a. CSA G30.18-09 (2012), 'Carbon Steel Bars for Concrete Reinforcement'.

## 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Tests and Evaluation Reports:
    - a. Manufacturer Reports: Equipment check-out sheets.
  - 2. Qualification Statements:

a. Technician certificate for use in HFC and HCFC refrigerants.

## B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Final, executed copy of Warranty.
  - b. Record Documentation:
    - 1) Manufacturers Documentation:
      - a) Equipment checkout sheet: Complete and sign all items for each unit.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Each unit shall be UL / ULC or ETL labeled.
  - 2. Comply with ANSI/AHRI Standard 210/240.
  - 3. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC free refrigerants.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  - 1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

## 1.5 WARRANTY

- A. Manufacturer's Warranty:
  - 1. Provide Manufacturer's Special LDS Warranty for the following:
    - a. Provide ten (10) year limited warranty on compressor and five (5) year limited warranty on parts from date of 'start-up'.
    - b. Record 'start-up' date on warranty certificate for each unit.

## PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Air-Rite Manufacturing, Bountiful, UT www.air-ritemfg.com.
      - 1) Blair Halverson (801) 295-2529.
    - b. Carrier Corporation:
      - 1) Carrier National: Bradley Brunner (270) 282-1241 Bradley.M.Brunner@Carier.utc.com.
      - 2) Carrier Utah: Rich Carpenter (Contractors HVAC Supply) (801) 410-6077 rcarpent@mtncom.net.
    - c. Lennox Industries:
      - 1) For pricing and information call Lennox National Account at (800) 367-6285.
      - 2) Lennox National Contact: Cody Jackson (801) 736-8904 Cody.Jackson@LennoxInd.com.
    - d. York International:
      - 1) Brian Michael (405) 419-6230 brian.k.michael@jci.com.
- B. Performance:
  - 1. Capacities: SEER rating as defined by AHRI shall be 13.0 or greater.
- C. Manufactured Units:
  - 1. Compressor Units (5 Tons or Less):
    - a. General:
      - 1) Units shall be operable down to 0 deg F outdoor temperature.
      - 2) Use R-410a refrigerant.
      - 3) Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.

- b. Condenser Coils:
  - Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes or micro-channel.
  - 2) Provide stamped louver coil guard for unit.
- c. Fans:
  - 1) Direct driven propeller type.
  - Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
  - 3) Motors shall be resiliently mounted.
  - 4) Each fan shall have a safety guard.
- d. Compressor:
  - 1) Each condenser unit shall have only one compressor.
  - 2) Design with following features:
    - a) Externally mounted brass service valves with charging connections.
    - b) Crankcase heater.
    - c) Resilient rubber mounts.
    - d) Compressor motor-overload protection.
    - e) Single speed.
- e. Controls:
  - 1) Factory wired and located in separate enclosure.
  - 2) Following three paragraphs may not be factory installed and will therefore have to be field installed.
  - 3) Safety devices:
    - a) High and low pressure cutout.
    - b) Condenser fan motor-overload devices.
  - 4) Anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
  - 5) Head pressure type low ambient kit.
- f. Casing:
  - 1) Fully weatherproof for outdoor installation. Finish shall be weather resistant.
- g. Openings shall be provided for power and refrigerant connections.
- h. Panels shall be removable for servicing.
- i. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) North Region:
    - a) Carrier: 24ABB3.
    - b) Lennox: 13ACXN.
    - c) York: YCD.
  - 2) Southeast Region:
    - a) Carrier: 24ACC4.
    - b) Lennox: 14ACX.
    - c) York: YCE.
  - 3) Southwest Region:
    - a) Carrier: 24AAA5.
      - b) Lennox: 14ACX.
      - c) York: YCS.

## 2.2 ACCESSORIES

- A. Vibration Isolators:
  - 1. 4 inches square by 3/4 inch thick minimum neoprene type vibration isolation pads anchored solidly to concrete slab.

## 2.3 ACCESSORIES

- A. Vibration Isolators:
  - 1. 4 inches square by 3/4 inch thick minimum neoprene type vibration isolation pads.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

## A. General:

- Set units level on concrete slab on vibration isolation pads located at each corner of unit. This does not apply to compressor units that have composite non-metal bottom.
- 2. Do not use capillary tube and piston type refrigerant metering devices.

## 3.2 INSTALLATION

#### A. General:

1. Coordinate with other trades affected by the Work of this section.

## B. Condensing Units:

- Set condensing units level on vibration isolation pads located at each corner of unit. This does not apply to compressor units that have composite non-metal bottom.
- 2. Do not use capillary tube and piston type refrigerant metering devices.

## 3.3 FIELD QUALITY CONTROL

- A. Manufacturer Services:
  - 1. Compressor units shall be started up, checked out, and adjusted by compressor unit Installer.
  - 2. Use equipment checkout sheet provided by Manufacturer:
    - a. Complete and sign all items on sheet.

# SECTION 23 7223 PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install air-to-air energy recovery ventilation units as described in Contract Documents
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 3114: 'Low-Pressure Metal Ducts'.
  - 3. Section 23 4100: 'Air filters'.

## 1.2 REFERENCES

- A. Reference Standard:
  - 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
  - 2. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 90A: 'Standard for the Installation of Air-Conditioning and Ventilating Systems' (2012 Edition).
    - b. NFPA 90B: 'Standard for the Installation of Warm Air Heating and Air-Conditioning Systems' 2012 Edition).

## 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. ASHRAE Compliance:

# 1.4 WARRANTY

- A. Special Warranty:
  - 1. Warranty energy transfer element for ten years from date of substantial completion of Project.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURER

- A. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
  - 1. Model number(s) as shown on Contract Drawings by RenewAire, Madison, WI www.renewaire.com.

## 2.2 PERFORMANCE

- A. Capacities:
  - Element rated by Manufacturer using method described in ANSI/ASHRAE 84. Exceed 70 percent temperature efficiency.
  - 2. Applicable for range of ventilation up to 800 CFM in each air stream without disposition of dust in elements.

## 2.3 MANUFACTURED UNITS

- A. Energy Recovery Units:
  - 1. Construction:
    - a. Fixed plate element.
    - b. 20 ga galvanized steel case with lapped corners.
    - c. Leveling legs.
    - d. Access door to blowers, energy transfer elements, and filters.
      - 1) Gasketed to provide air tight seal.
      - 2) Insulated with 1/4 inch Rubatex.
      - 3) Attached to unit using stainless steel fasteners.
  - 2. Duct Openings: Four each 1/2 inch by 1/2 inch square duct collars suitable for connection to duct work.
  - 3. Duct Openings: Four each 12 inch round duct collars suitable for connection to duct work.
  - 4. Blowers:
    - a. Forward curved blades directionally driven by open, drip-proof PSC motor rated for continuous duty.
    - b. Motor: 2-3/4 horse power, 115 VAC, single phase, 60 hertz.
    - c. Baked enamel finish.
  - 24 VAC control voltage.
  - 6. Vibration Isolation: 4 inch by 1/2 inch thick minimum neoprene type vibration isolation pads.

## 2.4 SOURCE QUALITY CONTROL

- A. Tests:
  - 1. Provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke development index (SDI) of 50. Meet NFPA 90A and NFPA 90B requirements.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install Vibration Isolator Under Each Corner of Energy Recovery Units.

# SECTION 23 8333 ELECTRIC RADIANT WALL HEATERS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install wall heaters as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Division 26: Electrical service and connections.

## 1.2 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Units shall be UL listed and comply with NEC.
  - 2. ASHRAE/IESNA Compliance:
    - a. Applicable requirements in ANSI/ASHRAE/IESNA 90.1, Section 6 'Heating, Ventilating, and Air-Conditioning'.

## PART 2 - PRODUCTS

# 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Berko, Marley Electric Co, Bennettsville. SC www.berkomeh.com.
    - b. QMark, Marley Electric Co, Bennettsville, SC www.qmarkmeh.com.
    - c. Raywall, Johnson, TN www.raywall.com.
- B. Wall Heaters.
  - 1. Fan type for recess mounting in wall.
  - 2. 20 ga minimum sheet metal casing.
  - 3. Heating element shall be encased in steel finned casting and protected by thermal switch.
  - 4. Fan motor shall be heavy duty enclosed and permanently lubricated.
  - 5. Fan shall be precision balanced and fan-motor assembly mounted to be vibration free.
  - 6. Units shall be controlled automatically by integral thermostat when heater is in 'ON' position.
  - 7. Heater shall have built-in fan delay.
  - 8. Finish: Baked-on enamel.
  - 9. Design Standard: AWH-4000 by Q-Mark.

PART 3 - EXECUTION: Not Used

# NIBLEY 12 & MENDON UTAH STAKE CENTER

# **DIVISION 26: ELECTRICAL**

Electrical
Common Electrical Requirements
Electrical Utility Services
Line-Voltage Electrical Power Conductors and Cables
Heating Cables
Control-Voltage Electrical Cables
Grounding and Bonding for Electrical Systems
Raceway and Boxes for Electrical Systems
Electrical Equipment Mounting Height Schedule
Lighting Control System
Low (Line) Voltage Distribution
Circuit-Breaker Panelboards
Wiring Devices
Enclosed Switches and Circuit Breakers
Electrical and Cathodic Protection
Facility Lightning Protection
Surge Protective Devices
Lighting
Interior Lighting
Interior Lighting: LED Dimming Drivers
Emergency Lighting
Exterior Lighting

DIVISION 26 ELECTRICAL

# SECTION 26 0501 COMMON ELECTRICAL REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. General electrical system requirements and procedures.
  - 2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
  - 3. Make electrical connections to equipment provided under other Sections.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchor bolts and templates for exterior lighting equipment bases.
- C. Related Requirements:
  - 1. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 2. Section 31 2316: 'Excavation' for criteria for performance of excavating.
  - 3. Section 31 2323: 'Fill' for criteria for performance of backfilling.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 70, National Electric Code (NEC).
  - 2. National Electrical Manufacturing Association Standards (NEMA):
    - a. NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide following information for each item of equipment:
      - 1) Catalog Sheets.
      - 2) Assembly details or dimension drawings.
      - 3) Installation instructions.
      - 4) Manufacturer's name and catalog number.
      - 5) Name of local supplier.
    - b. Furnish such information for following equipment:
      - 1) Section 26 0520: 'Heating Cables' for heating cable equipment.
      - 2) Section 26 2417: 'Circuit-Breaker Panelboards'.
      - 3) Section 26 2418: 'Fusible Panelboards'.
      - 4) Section 26 2726: 'Wiring Devices' for lighting control and dimmer equipment.
      - 5) Section 26 2816: 'Enclosed Switches And Circuit Breakers'.
      - 6) Section 26 5100: 'Interior Lighting Fixtures'.
      - 7) Section 26 5200: 'Emergency Lighting' for battery units.
      - 8) Section 26 5600: 'Exterior Lighting' for fixtures, poles, and associated control equipment.
    - c. Do not purchase equipment before approval of product data.
  - 2. Shop Drawings:
    - a. Submit on Panelboards:
    - b. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:

- a. Report of site tests, before Substantial Completion.
- 2. Qualification Statement:
  - a. Electrical Subcontractor:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
  - b. Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature.
        - b) Include copy of approved shop drawings.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
  - 2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - Electrical Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in electrical installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  - 2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

# PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Performance:
  - 1. Design Criteria:
    - a. Materials and equipment provided under following Sections shall be by same Manufacturer:
      - 1) Section 26 2417: Panelboards.
      - 2) Section 26 2816: Enclosed Switches And Circuit Breakers.

## PART 3 - EXECUTION

# 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

## 3.2 EXAMINATION

- A. Verification Of Conditions:
  - Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site
    dimensions and with other Sections.

## 3.3 INSTALLATION

#### A. General:

- 1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
- 2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
  - a. Notify Architect of conflicts before beginning work.
  - b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc., so they will be readily accessible and functional.
- 3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.
- B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

## 3.4 FIELD QUALITY CONTROL

## A. Field Tests:

- Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.
- 2. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.

## 3.5 CLOSEOUT ACTIVITIES

#### A. Training:

1. Provide competent instructor for three (3) days to train Owner's maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

# SECTION 26 0503 ELECTRICAL UTILITY SERVICES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install service as described in Contract Documents and as required by local serving agency.
  - 2. Complete cost of service.
- B. Related Requirements:
  - 1. Section 03 3111: Transformer pad.
  - 2. Section 26 0501: Common Electrical Requirements.
  - 3. Local utility shall furnish and install primary underground service including transformer, conductors, current transformers, metering conductors, and meter.

PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Interface with Other Work: Coordinate with serving agency on all items, especially service entrance fittings, meter sockets, and current transformer (C/T) boxes where required.

# SECTION 26 0519 LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of conductors used on Project except as excluded below.
- B. Related Requirements:
  - Section 23 0933: 'Electric and Electronic Control System for HVAC' for conductors and cables for temperature control system.
  - 2. Section 26 0501: 'Common Electrical Requirements'.

## 1.2 REFERENCES

- A. Definitions:
  - 1. Line Voltage: Over 70 Volts.
- B. Reference Standards:
  - 1. National Fire Protection Association:
    - NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ
      including all applicable amendments and supplements).
      - 1) Article 334, "Nonmettalic-Sheathed Cable, Types NM, NMC And NMS'.

## PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Line Voltage Conductors:
  - 1. Copper with AWG sizes as shown:
    - a. Minimum size shall be No. 12 except where specified otherwise.
    - b. Conductor size No. 8 and larger shall be stranded.
  - 2. Insulation:
    - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg F).
    - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg F).
    - c. Higher temperature insulation as required by NFPA 70 or local codes.
  - 3. Colors:
    - a. 208Y / 120 V System:
      - 1) Black: Phase A.
      - 2) Red: Phase B.
      - 3) Blue: Phase C.
      - 4) Green: Ground.
      - 5) White: Neutral.
    - b. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
    - For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.
- B. Line Voltage Cables:
  - 1. Non-Metallic Sheathed Cable (NM) and Metal Clad Cable (MC) may be used as restricted below:
    - a. Copper conductors.
    - b. Sizes #12 through #8.
    - c. Use only in indoor dry locations where:

- 1) Not subject to damage.
- 2) Not in contact with earth.
- d. Not in concrete.
- e. Not where exposed or not concealed.
- f. Not over suspended ceilings.
- g. As restricted by NFPA 70 Article 334.
- C. Cord Sets For Ranges: Three pole, 4 wire grounding, 125/250V, NEMA 14-50P plug, 48 inch cord length minimum.

#### D. Standard Connectors:

- 1. Conductors No. 8 And Smaller: Steel spring wire connectors.
- 2. Conductors Larger Than No. 8: Pressure type terminal lugs.
- 3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

#### A. General:

- 1. Conductors and cables shall be continuous from outlet to outlet.
- 2. Do not use direct burial cable.

## B. Line Voltage Conductors:

- 1. Install conductors in raceway where indicated on Contract Drawings. Run conductors of different voltage systems in separate conduits.
- 2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Contract Drawings.
- Neutrals:
  - a. On three-phase, 4-wire systems, do not use common neutral for more than three circuits.
  - b. On single-phase, 3-wire systems, do not use common neutral for more than two circuits.
  - c. Run separate neutrals for each circuit where specifically noted on Contract Drawings.
  - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs:
    - 1) Provide breaker tie so that all circuits that share common neutral are simultaneously disconnected.
    - 2) Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.

# 4. Pulling Conductors:

- a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
- b. Do not use heavy mechanical means for pulling conductors.
- c. Use only listed wire pulling lubricants.

# C. Line Voltage Cables:

- 1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
- 2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
- 3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
- 4. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
- 5. Install exposed cables parallel to or at right angles to building structure lines.
- 6. Keep cables 6 inches minimum from hot water pipes.
- 7. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
- 8. Prohibited procedures:
  - a. Boring holes for installation of cables in vertical truss members.
  - b. Notching of structural members for installation of cables.

# SECTION 26 0520 HEATING CABLES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install electric heating cable system for rain gutters and roof eaves as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

## 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Rain Gutter and Roof Eaves:
      - Show layout spacing and cable sizing required by Cable Manufacturer for site conditions. Provide watts per lineal feet at required AC voltage for cable to be used.
- B. Informational Submittals:
  - 1. Qualification Statements:
    - a. Installer:
      - 1) Show Factory Certification if required.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include copy of final, executed warranty.

## 1.3 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies but not limited to following:
  - 1. Installers:
    - a. Installer shall be performed by Factory Certified Installer.
    - b. Provide documentation if requested by Architect.

# 1.4 WARRANTY

- A. Manufacturer Warranty:
  - 1. Rain Gutter System:
    - a. Manufacturer's ten (10) year warranty covering workmanship and defective materials.

## PART 2 - PRODUCTS

# 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Bylin Engineered Systems, El Dorado Hills, CA www.bylinusa.com.

- b. Easy Heat, East Granby, CT www.easyheat.com or EasyHeat Ltd, Waterloo, ON (800) 794-3766 or (519) 885-2850.
- c. Heat Trace Products, LLC. Leominster, MA www.rscc-heattrace.com.
- d. Nelson Heat Tracing Systems, East Granby, CT www.nelsonheaters.com.
- e. Pass & Seymour, Syracuse, NY or Pass & Seymour Canada Inc, Concord, ON www.passandseymour.com.
- f. ProLine, Draper, UT www.prolineradiant.com.
- g. Raychem Corporation, Menlo Park, CA www.tycothermal.com or Raychem Canada Ltd, Toronto, ON (800)988-5171 or (416) 234-0886. Raychem sold thru Pentair, Houston, TX www.pentairthermal.com.
- h. Square D Co, Palatine, IL www.us.squared.com or Square D Co / Schneider Electric, Toronto, ON (800) 565-6699 or (416) 752-8020.
- i. Technitrace Inc, Murray, UT www.technatrace.com.
- j. Thermon Manufacturing Co, San Marcos, TX www.thermon.com.
- k. WarmZone Inc, Salt Lake City, UT www.warmzone.com.

## B. Materials:

- L. Rain Gutter And Roof Eave Heaters:
  - a. Cable:
    - 1) Class One Quality Standard. See Section 01 6200 for quality standard definition:
      - a) Raychem GM-1X.
  - b. Temperature And Moisture Sensors:
    - 1) Design Standard:
      - a) Gutter Sensor: GIT-1 by Raychem.
      - b) Roof Sensor: CIT-1 by Raychem.
  - c. Contactor (if required):
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Easy Heat: PC series.
      - b) Square 'D': Class 8502.
  - d. Pilot Light:
    - 1) Include plate with engraved text, 'ROOF HEATING CABLE'.
    - 2) Class Two Quality Standard. See Section 01 6200 for quality standard definition:
      - a) Pass & Seymour 2151 Red.
  - e. Factory prepared, UL / ULC recognized splice and termination kits by Cable Manufacturer.
  - f. Controller:
    - 1) Class Two Quality Standard. See Section 01 6200 for quality standard definition:
      - a) Pertair by Raychem PD Pro for 120V or GF for 200-277V.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. General:
  - 1. Install electric heating cable not to void Roofing Manufacturer system warranty.
  - 2. Provide materials and labor including engineering if required, to prevent and remedy damage to roof integrity.
- B. Rain Gutter And Roof Eave Heaters:
  - 1. Install moisture probes for controller in rain gutter and roof.
  - 2. Install pilot light in corridor or foyer to indicate when cables are operating.
  - 3. Terminate raceway on exterior of building at heat cable location with weatherproof junction box.
  - 4. Install cable using approved spacers and without penetrating rain gutter or roofing material.
  - 5. Install all cable, controllers, sensors and etc. per Manufacturer's written installation instructions.

# 3.2 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to Owner
  - 2. Correct any damage to roofing material at no additional cost to Owner.

HEATING CABLES - 2 - 26 0520

# SECTION 26 0523 CONTROL-VOLTAGE ELECTRICAL CABLES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install control-voltage electrical cables as described in Contract Documents.
- B. Related Requirements:
  - Section 23 0933: 'Electric And Electronic Control System For HVAC' for cables for Temperature Control System cables.
  - 2. Section 26 0501: 'Common Electrical Requirements'.
  - 3. Section 26 0924: 'Lighting Control System'.
  - 4. Section 27 1116: 'Communications Cabinets, Racks, Frames, and Enclosures'.
  - 5. Section 27 1501: 'Communications Horizontal Cabling' for voice and data system cables.
  - 6. Section 27 4117: 'Video Systems' for cables.
  - 7. Section 27 5117: 'Audio Systems' for cables.
  - 8. Section 28 3101: 'Fire Detection And Alarm System' for cables.

# 1.2 REFERENCES

- A. Definitions:
  - 1. Control Voltage: 70 Volts and under.

## PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Manufacturers:
  - 1. Category Four Approved Cable Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Alpha Wire Co, Elizabeth, NJ www.alphawire.com.
    - b. Belden Wire & Cable Co, Richmond, IN www.belden.com.
    - c. Liberty Wire & Cable, Colorado Springs, CO www.libertycable.com.
    - d. West Penn Wire Corp, Washington, PA www.westpenn-cdt.com.
- B. Components:
  - 1. Building Control System Cables.
    - a. CAT 5E, 24 AWG, solid bare copper, four pair, UTP, white cable jacket.
    - b. Sheath Colors:
      - 1) Lighting Control: Yellow.
      - Meet requirements of EIA / TIA 568 Standard.
  - 2. Lighting Control Cables and Conductors:
    - a. Provide cable per Lighting Control Panel Manufacturer's recommendations and requirements.
    - b. Lighting Control Cables ran in same raceway as line voltage cables shall have same insulation voltage rating as line voltage conductors.
    - c. Cable Jacket shall be yellow.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

## A. General:

- 1. Cables shall be continuous and without splices from source to outlet.
- 2. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
- 3. Run exposed cables parallel to or at right angles to building structure lines.
- 4. Keep cables 6 inch minimum from hot water pipes.
- 5. Support cables using approved staples, cable ties, straps, hangers, or similar fittings spaced every 3 feet.
- 6. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be 1/2 inch diameter maximum.
- 7. Bundle only cables of same systems together.
- 8. Do not run cables within 10 inches of line voltage conductors/raceways.
- 9. Extend cables 18 inches from wall or ceiling at all outlet locations. Extend cables to twice vertical length of cabinet at each cabinet location.
- 10. Pulling cables into conduit:
  - Do not pull cables until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
  - b. Do not use heavy mechanical means for pulling cables.
  - c. Use only listed wire pulling lubricants.
- 11. Prohibited procedures:
  - a. Boring holes for installation of cables in vertical truss members.
  - b. Notching of structural members for installation of cables.

## B. Control Cables:

- 1. For cables not installed in raceway, do not run cables within 10 inches of line voltage conductors / raceways. Also, maintain 10 inches minimum between following exposed cable groups:
  - a. Microphone cables.
  - b. CAT-6, sound system control, telephone, video, or ATC cables.
  - c. Loudspeaker cables.

# SECTION 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish and install grounding for electrical installation as described in Contract Documents except as excluded below.
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete'.
    - a. Pre-installation conference held jointly with other concrete related sections.
  - 2. Section 26 0501: 'Common Electrical Requirements'.
  - 3. Section 26 4301: 'Surge Protection Devices'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. Institute of Electrical and. Electronics Engineers (IEEE):
    - IEEE 837-2014, 'Standard for Qualifying Permanent Connections Used in Substation Grounding'.
  - National Fire Protection Association:
    - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
      - 1) Article 680, 'Swimming Pools, Spas, Hot Tubs, Fountains, and Similar Installations'.
    - b. NFPA (Fire) 780, 'Standard for the Installation of Lightning Protection Systems' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
  - 3. Telecommunications Industry Association:
    - a. TIA-942, 'Telecommunications Infrastructure Standard for Data Centers' (Revision A, 2014).
  - 4. Section 27 1116: 'Communications Cabinets, Racks, Frames, and Enclosures'.
  - 5. Section 27 1501: 'Communications Horizontal Cabling' for cables for Telephone and Data Systems.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.
  - 2. In addition to agenda items specified in Section 01 3100 and 31 3111, review following:
    - a. Review Architect's inspection of grounding conductor installation before placement of concrete.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Requirements of Section 27 1501 applies, but is not limited to following:
    - Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
    - b. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
  - 2. Systems shall be installed per NFPA 780 and NFPA 70.
  - 3. All Bonds shall comply with most current version of IEEE 837 Standard.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
  - 1. Installers Qualifications:
    - a. Grounding and Bonding:

- 1) Licensed electrical contractor shall perform installation and termination of main bonding conductor to building service entrance ground.
- 2) Licensed in State that Work is to be performed.

## PART 2 - PRODUCTS

## 2.1 SYSTEM

#### A. Manufacturers:

- 1. Type One Acceptable Products:
  - a. 'Cadweld' by Erico International, Solon, OH www.erico.com.
  - b. 'ThermOweld' by Continental Industries, Tulsa, NE www.conind.com.
  - c. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Performance:

- 1. Design Criteria:
  - a. Size materials as shown on Drawings and in accordance with applicable codes.
  - b. Bonding System Workmanship:
    - 1) The ground/earthing system shall be designed for high reliability and shall meet following criteria:
      - a) Local electrical codes shall be adhered to.
      - b) All grounding/earthing conductors shall be copper.
      - c) Regulatory Agency Sustainability Approvals requirements are required.
  - c. Rack and Cabinet Grounding/Earthing:
    - 1) Equipment and racks shall be bonded in accordance with methods prescribed in TIA-942.
    - 2) All grounding backbone should be #6 AWG copper cable.
    - 3) In telecommunications spaces with small number of racks or cabinets, rack/cabinet grounding/earthing jumper cable directly to telecommunications ground bus is permitted. Large spaces shall utilize mesh Common Bonding network, or overhead grounding backbone.
    - 4) Equipment racks, housings, messenger cables, and raceways:
      - Connect cabinets, racks, frames and terminal boards to single-point ground which is connected to building ground system proper sized, bonded and tested green insulated copper grounding conductor.

#### C. Materials:

- 1. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.
- Make grounding conductor connections to ground rods and foundation ground loop using approved bolted clamps listed for such use.
- 3. Service Grounding Connections And Cable Splices: Make by exothermic process.
- 4. Telecommunications ground bus bar (TGB): copper.
  - a. Grounding bus bar:
    - 1) Technology Room shall be provided with telecommunications ground bus bar (TGB).
    - 2) Ground loop current potential is minimized between telecommunications equipment and electrical system to which it is attached.
  - b. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in Technology Room shall be grounded to respective TGB using minimum #6 AWG stranded copper bonding conductor and compression connectors.
- 5. Equipment bonding for Baptismal Fonts:
  - a. Copper Lug Mechanical Connector:
    - 1) Provide copper connectors to bond to metallic element fastener.
    - 2) Type One Acceptable Products:
      - a) Pentair EL4 by Erico International, Solon, OH www.erico.com.
      - b) Equal as approved by Architect before bidding. See Section 01 6200.
  - b. Grounding Clamps and Connectors:
    - 1) Provide heavy duty rebar clamps to bond to structural reinforcing bars.
    - 2) Type One Acceptable Products:
      - a) RC70 by Eritech International, Glendale, CA www.eritech.com:
      - b) Equal as approved by Architect before bidding. See Section 01 6200.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete.

  Do not allow placement of concrete before Architect's inspection of grounding conductor installation.
- B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
  - 1. Electrical service, its equipment and enclosures.
  - 2. Conduits and other conductor enclosures.
  - 3. Neutral or identified conductor of interior wiring system.
  - 4. Main panelboard, power and lighting panelboards.
  - 5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
  - 6. Lightning protection down conductors including but not limited to conductor from steeple.
- C. Provide concrete-encased electrode system by embedding 20 feet minimum of No. 2/0 bare copper conductor in concrete footing that is in direct contact with the earth, 2 inches minimum below concrete surface. Extend No. 2/0 copper conductor to main panel as shown on Drawings.
- D. Ground identified common conductor of electrical system at secondary side of main transformer supplying building. Ground identified grounded (neutral) conductor of electrical system on supply side of main service disconnect.
- E. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding 72 inches in length, and in flexible conduit connecting to mechanical equipment.
- F. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- G. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- H. Connect equipment grounds to building system ground.
  - 1. Use same size equipment grounding conductors as Phased conductors up through #10 AWG.
  - 2. Use NEC Table 250-95 for others unless noted otherwise in Drawings.
- I. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.
- J. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.
- K. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.
- L. TGB shall be 1/4 inch thick x 2 inches high x 12 inches long installed with insulated standoffs at location directed.
- M. Ground rack to TGB using #6 copper conductor and compression connector.
  - 1. Equipment bonding for Baptismal Fonts:
    - a. Copper Lug Mechanical Connector:
      - 1) Connect all metallic elements of baptismal font as shown in Contract Drawings.
    - b. Grounding Clamps and Connectors:
      - 1) Connect to structural reinforcing bars as per NFPA 70 Article 680 and as shown in Contract Drawings.

# 3.2 FIELD QUALITY CONTROL

- A. Field Inspections:
  - 1. Notify Architect for inspection two (2) days minimum before placing concrete over grounding conductor.
  - 2. Grounding Well integrity shall be tested separately and together with Lightning Protection System integrity.

# SECTION 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
  - Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
  - 3. Furnish and install air-vapor barrier boxes as described in Contract Documents.
  - 4. Furnish and install main electrical service raceway as described in Contract Documents and comply with electrical utility company requirements.
  - 5. Furnish and install main telephone service raceway as described in Contract Documents and comply with telephone company requirements.
  - 6. Furnish and install internet service raceway as described in Contract Documents and comply with internet service company requirements.

## B. Related Requirements:

- 1. See Section 07 8400: 'Firestopping' for raceways penetrating fire rated walls, ceilings, and barriers'.
- Section 23 0933: 'Electric and Electronic Control System for HVAC' for concealed raceway and extensions for temperature control system.
- 3. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.
- 4. Section 26 0503: 'Electrical Utility Services' for electrical primary underground service requirements.
- 5. Section 27 1501: 'Communications Horizontal Cabling' for raceway for telephone and data systems.
- 6. Section 27 4117: 'Video Systems' for system wiring.
- 7. Section 27 5117: 'Audio Systems' for sound system wiring.
- 8. Section 28 3101: 'Fire Detection And Alarm System' for clarification of raceway and conduit requirements for detection and alarm system.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

## PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cooper B-Line, Highland, IL www.b-line.com.
    - b. Hubbell Incorporated, Milford, CT www.hubbell-wiring.com or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
    - c. Square D, Palatine, IL www.squared.com.
    - d. Thomas & Betts, Memphis, TN www.tnb.com or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
    - e. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
    - f. Wiremold Co, West Hartford, CT www.wiremold.com.
- B. Materials:

- 1. Raceway And Conduit:
  - a. Sizes:
    - 1) 3/4 inch for exterior use, unless indicated otherwise.
    - 2) 1/2 inch for interior use, unless indicated otherwise.
  - Types: Usage of each type is restricted as specified below by product.
    - Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas.
       Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
    - Galvanized Electrical Metallic Tubing (EMT), Flexible Steel Conduit, and Electrical Non-Metallic Tubing (ENT):
      - a) Allowed for use only in indoor dry locations where it is:
        - (1) Not subject to damage.
        - (2) Not in contact with earth.
        - (3) Not in concrete.
      - For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
    - 3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
      - Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
    - 4) Listed, Liquid-Tight Flexible Metal Conduit:
      - a) Use in outdoor final connections to mechanical equipment, length not to exceed 36 inches.
    - 5) Pre-wired 3/8 Inch Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches.
  - c. Prohibited Raceway Materials:
    - 1) Aluminum conduit.
    - 2) Armored cable type AC (BX) cable.
- Raceway And Conduit Fittings:
  - a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
  - b. EMT:
    - 1) Compression type.
    - 2) Steel set screw housing type.
  - c. PVC Conduit:
    - 1) PVC type. Use PVC adapters at all boxes.
    - 2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
  - d. Flexible Steel Conduit: Screw-in type.
  - e. Liquid-tight Flexible Metal Conduit: Sealtite type.
  - f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
  - g. Prohibited Fitting Materials:
    - 1) Crimp-on, tap-on, indenter type fittings.
    - 2) Cast set-screw fittings for EMT.
    - 3) Spray (aerosol) PVC cement.
- 3. Outlet Boxes:
  - a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
    - 1) Provide metal supports and other accessories for installation of each box.
    - 2) Equip ceiling and bracket fixture boxes with fixture studs where required.
    - Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
  - b. Non-metallic boxes may be used only for control voltage wiring systems.
  - c. Telephone / data outlet boxes shall be single device outlet boxes.
  - d. HVAC Instrumentation And Control:
    - 1) Junction boxes in mechanical equipment areas shall be 4 inches square.
    - 2) Boxes for remote temperature sensor devices shall be recessed single device.
    - 3) Boxes for thermostats shall be 4 inches square with raised single device cover.
- 4. Air-Vapor Barrier Boxes:
  - a. Pre-molded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes.
  - b. Class Two Quality Standard:
    - 1) Approved Manufacturer. See Section 01 6200 for definitions of Classes.
      - a) Lessco Low Energy Systems Supply Company, Inc., Campbellsport, WI www.lessco-airtight.com.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

## A. Verification Of Conditions:

 Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

#### 3.2 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
  - 2. Coordinate with Division 27 for installation of raceway for sound system.
  - Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
    - a. Coordinate location of outlet for water coolers with Division 22.
    - Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlets under his direction.
  - Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.

#### B. General

- 1. Sound system electrical components furnished by Division 27 and installed under this Section include following items:
  - a. Speaker mounting rings.
  - b. Speaker enclosures.

## C. Conduit And Raceway:

- 1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
- 2. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.
- 3. Keep raceway runs 6 inches minimum from hot water pipes.
- 4. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
  - a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
  - b. Radius of curve shall be at least minimum indicated by NFPA 70.
- 5. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
- 6. Run two spare conduits from each new panelboard to ceiling access area or other acceptable accessible area and cap for future use.
- 7. Bend PVC conduit by hot box bender and, for PVC 2 inches in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
- 8. Installation In Framing:
  - a. Do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
  - b. Holes shall be one inch diameter maximum.
- 9. Underground Raceway And Conduit:
  - a. Bury underground raceway installed outside building 24 inches deep minimum.
  - b. Bury underground conduit in planting areas 24 inches deep minimum. It is permissible to install conduit 6 inch below concrete sidewalks, however, conduit must be buried 24 inches deep at point of exit from planting areas.
- 10. Conduit And Raceway Support:
  - a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
  - b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
    - 1) Expansion shields in concrete or solid masonry.
    - 2) Toggle bolts on hollow masonry units.
    - 3) Wood screws on wood.
    - 4) Metal screws on metal.

## 11. Prohibited Procedures:

- a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
- b. Installation of raceway that has been crushed or deformed.
- c. Use of torches for bending PVC.
- d. Spray applied PVC cement.
- e. Boring holes in truss members.
- f. Notching of structural members.
- g. Supporting raceway from ceiling system support wires.
- h. Nail drive straps or tie wire for supporting raceway.

#### D. Boxes:

- 1. Boxes shall be accessible and installed with approved cover.
- Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
- 3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
- 4. Install outlets flush with finished surface and level and plumb.
- 5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
- 6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
- 7. Install air-vapor barrier boxes.
  - a. Follow Manufacturer's installation instructions.
  - b. Care should be taken to cut above grade vapor barrier and seal around recessed outlet boxes to minimize air infiltration.

#### 8. Location:

- a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Contract Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be 6 inches from door jamb.
- b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
- c. Center ceramic tile boxes in tile.
- E. Support speaker enclosures and mounting rings from structure or ceiling suspension system.

## **SECTION 26 0613** ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

PART 1 - GENERAL: Not Used

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

#### 3.1 INSTALLATION

Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor. Refer special conditions to Architect before rough-in and locate outlet under his direction.

#### В. Mounting Heights:

HVAC:

Temperature Control Junction Boxes: a. As indicated on Drawings. Thermostats not mounted in occupied space: As indicated on Drawings. b.

Remote Temperature Sensors and thermostats mounted in occupied space: C.

Wall-Mounted 50 inches to top. Indoor Motor Disconnects: 60 inches.

e. Outdoor Motor Disconnects: As indicated on Drawings.

f. Motor Controls: 60 inches.

Plumbing:

d.

**Electric Water Cooler Outlets:** Mount so outlet and cord are hidden by

water cooler and outlet is accessible for

resetting for GFCI trip.

18 inches.

Electrical:

Distribution Panels: 72 inches to top. Receptacles: 18 inches. b. Wall Switches: 42 inches. C. Wall-Mounted Exit Lights: 90 inches. **Emergency Lighting Units:** 60 inches.

Communications

Sound Distribution System Components: As indicated on Drawings. Satellite Distribution System Components: As indicated on Drawings. TV Distribution System Components: As indicated on Drawings.

Computer and TV: 18 inches.

Telephone / Data Terminal Boards: 72 inches to top. Telephones (wall type): f. 60 inches. Telephones (desk type): 18 inches. g. Telephone / Data (desk type): h. 18 inches. Data (desk type):

## SECTION 26 0924 LIGHTING CONTROL SYSTEM

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete lighting control system as described in Contract Documents consisting of the following:
    - a. Lighting Control Panel.
    - b. Programmable Digital Control Switches.
    - c. Photocells.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 0523: 'Control-Voltage Electrical Cables'.

#### 1.2 REFERENCES

- A. Definitions:
  - 1. Class A: Equipment has been tested and found to comply with limits for Class A digital device, pursuant to part 15 of FCC Rules. These limits provide reasonable protection against harmful interference when equipment is operated in commercial environment.
- B. Reference Standards:
  - 1. Federal Communications Commission (FCC):
    - a. Emission requirements for Class A applications.
  - 2. Underwriters Laboratories:
    - a. UL 916, 'Energy Management Equipment' (2007).

#### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certifications:
    - a. Technician Certification that equipment has been installed, adjusted and tested in accordance with Manufacturer's recommendations.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Equipment operation and maintenance manual(s).

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. All control equipment shall be in compliance with FCC emissions' standards in Part 15 Subpart J for Class A application.
  - 2. Programmable panelboards shall be UL listed under UL 916 Energy Management Equipment.
- B. Qualifications:
  - 1. Manufacturer Qualifications:
    - a. Manufacturer of assembly shall be manufacturer of major components with assembly.
    - b. Manufacturer of this equipment shall have minimum of five (5) years manufacturing experience.
  - 2. Technician Qualifications:

- a. Authorized by Manufacturer and trained.
- b. Have thorough knowledge of software, hardware and system programming.

#### C. Certifications:

1. Provide Technician Certification that equipment has been installed, adjusted and tested in accordance with Manufacturer's recommendations.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Equipment shall be delivered, handled and stored in accordance with manufacturer's instructions.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

#### A. Manufacturers:

- 1. Type One Acceptable Manufacturer:
  - a. Acuity Brands Inc., Atlanta, GA www.acuitybrands.com.
  - b. Hubbell Building Automation, Austin, TX www.hubbell-automation.com.
  - c. Leviton Manufacturing Co, Little Neck, NY www.leviton.com or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
  - d. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
  - e. Watt Stopper Inc., Santa Clara, CA www.wattstopper.com.
  - f. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Design Criteria:

- 1. Lighting Control System shall meet or exceed following capabilities:
  - a. Capable of switching for specific lighting zone for following:
    - Time-of-day scheduling
    - 2) Daylight savings time adjustments.
    - 3) Light level sensors.

#### C. Components:

- Light Control Panel:
  - a. Enclosure/tub shall be NEMA 1 unless indicated otherwise on Drawings, sized to accommodate required components.
  - b. Cover shall have hinged and lockable door and be configured for flush mounting of panel.
  - c. Panel shall include power supply and interior assembly with motherboard and control electronics.
    - 1) Interior construction shall provide isolation between line voltage and low voltage (class 2) wiring.
  - d. Panel shall be factory assembled and designed for disassembly for mounting enclosure first and reassembly after conduit installation.
  - e. Panel shall utilize mechanically held latching relays rated for 30A ballast load at 120/277VAC with 10,000A short circuit current rating and shall include contactor for exterior lighting control.
    - 1) Visual LED status and manual override for each relay shall be included.
  - f. Panel shall contain network clock/programmer and photocell control module for interface with interior and exterior photocell controls.
    - Network clock shall provide menu driven control for seven (7) day repeating schedules and holiday provisions.
    - Clock shall provide user selectable pre-programmed scenarios for: Scheduled on/off, Manual on/off, Scheduled off, and on/off when used with photocell control module.
  - g. Panel shall contain automation intelligence card for program, monitor, and control functions and group cards as required for control of groups of relays.
- 2. Programmable Digital Control Switches:
  - a. Programmable digital control switches shall be provided with number of control buttons as indicated on Contract Drawings.
    - Each button shall be capable of individual programming without use of computer or other programming device.
    - 2) Each button shall be able to control individual relay or group of relays.

- 3) Individual buttons shall allow for permanent labeling.
- b. Switches shall be illuminated for ease of location in dark.
- 3. Photocells:
  - a. Weatherproof Class 2 photocell shall be provided for exterior light levels.
  - b. Adjustable interior photo cell shall be provided for day-lighting control.
    - 1) Photocell shall provide output suitable for controlling continuously dimming loads.
    - 2) Refer to Contract Drawings for fixtures to be controlled.

#### 3.1 INSTALLATION

- A. General:
  - 1. Install switches flush with wall, straight and level.
  - 2. Permanently label switches as shown on drawing schedule in Contract Drawings.
- B. Interface With Other Work:
  - 1. Coordinate with appropriate Sections of Divisions 26.
  - 2. Program system to meet the local energy code.

## 3.2 FIELD QUALITY CONTROL

- A. Field Testing:
  - 1. Manufacturer shall provide Manufacturer's authorized Technician to adequately test supplied equipment and software to ensure system performs as intended including the following:
    - a. Test start-up system and confirm proper installation, operation, and adjustment of all system components.
  - 2. Submit Certification in writing that equipment has been installed, adjusted and tested in accordance with Manufacturer's recommendations.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to following:
  - 1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.

#### 3.3 CLOSE-OUT ACTIVITIES

- A. Instruction of Owner:
  - 1. Provide Manufacturer's authorized Technician training session for Owner's Representative(s) for demonstrating operation and programming of completed system.
    - a. Training program shall include instructions on control system, programming, and other major components. Provide Manufacturer Manual(s) to be submitted to Owner to assist training.
    - b. Training program shall include:
      - 1) System review of all system components and their function.
      - 2) System review of all management software and its function.
      - 3) Operator training to develop experience with control applications.

## SECTION 26 2417 CIRCUIT-BREAKER PANELBOARDS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install circuit-breaker panelboards as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 4301: 'Surge Protection Devices'.

## PART 2 - PRODUCTS

## 2.1 EQUIPMENT

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cutler-Hammer Inc, Pittsburgh, PA www.eatonelectric.com.
    - b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
    - c. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com.
    - d. Square D Co, Palatine, IL www.us.squared.com.

#### B. Performance:

- 1. Capacities:
  - a. Panelboard:
    - 1) Minimum integrated equipment short circuit rating of 22,000 amperes for 120 / 208 Volts.
    - 2) Minimum integrated equipment short circuit rating of 50,000 amperes for 277 / 280 Volts.
    - 3) Rated for use as service entrance equipment.
  - b. Lighting And Appliance Panelboards:
    - 1) Minimum integrated equipment short circuit rating of 10,000 amperes for 120 / 208 Volts.
    - 2) Minimum integrated equipment short circuit rating of 14,000 amperes for 277 / 480 Volts.
  - c. Load Centers:
    - 1) 125 Amp main lugs, 120 / 208 Volt, three-phase.
    - 2) Minimum integrated equipment short circuit rating of 10,000 Amps.

#### C. Material:

- 1. Circuit-breaker type.
- 2. Galvanized steel cabinets
- 3. Bussing and lugs arranged as required.
- 4. Multi-pole circuit-breakers shall be common trip.
- 5. Circuit-breakers shall be molded case thermal magnetic type with inverse time characteristics.
- 6. Main Panelboard:
  - a. Surface-mounted and front accessible.
  - b. Enclosures:
    - 1) Exterior of Building:
      - a) NEMA / CEMA Type 3R with locking door.
    - 2) Interior of Building:
      - a) NEMA / CEMA Type 1.
  - . Minimum dimensions of 32 inches wide by 8 inches deep.
  - d. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 100 Amp, three-pole circuit-breaker.
  - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Type PRL4B by Cutler-Hammer.

- 2) Spectra Series by General Electric.
- 3) Type P4 by Siemens.
- 4) I-Line by Square D.
- 7. Lighting And Appliance Panelboards:
  - a. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
  - b. Factory installed or provided circuit number identification for each breaker and space.
  - c. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
  - d. Minimum dimensions of 20 inches wide by 5-3/4 inches deep.
  - e. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 20 Amp, single-pole circuit-breaker.
  - f. Breakers specified to be shunt trip and shall include shunt trip accessories to remotely trip breaker using separate 120 V power source. Trip coil shall include coil-clearing contact to break coil current when breaker opens.
  - g. Use equipment from same manufacturer as main panelboard.
  - h. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Type PRL1a by Cutler-Hammer.
    - 2) Type AL or AQ by General Electric.
    - 3) Type P1 by Siemens.
    - 4) Type NQOD by Square D.
- 8. Load Centers:
  - Surface-mounted, outdoor NEMA Type 3R enclosure with padlocking provisions. 12-1/2 inches wide by 4-1/2 inch deep minimum.
  - b. HACR type circuit breakers.
  - c. Use equipment from same manufacturer as main panelboard.
  - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Type CH by Eaton.
    - 2) Type PowerMark Plus by General Electric.
    - 3) Type PL by Siemens.
    - 4) Type QO by Square D.

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine wall framing and verify framing for proper spacing for installation of panelboard(s).
    - a. Notify Architect of improper spacing in writing.

#### 3.2 INSTALLATION

- A. Label panelboards, load centers, and each breaker in main panelboard with 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high.
- B. Provide typewritten circuit schedules in lighting and distribution panelboards and load centers to identify panelboard and load served by each branch breaker.
- C. Arrange conductors neatly within panelboards and load centers.
- D. Secure to structure in accordance with requirements of Project seismic design category.

## 3.3 PROTECTION

A. Protect panelboards, load centers, and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

## SECTION 26 2726 WIRING DEVICES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install wiring devices complete with plates as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 27 1116: 'Communications Cabinets, Racks, Frames, and Enclosures'.
  - 3. Section 27 1501: 'Communications Horizontal Cabling' for cables for telephone and data systems.

#### PART 2 - PRODUCTS

## 2.1 COMPONENTS

- A. Manufacturers:
  - Manufacturer Contact List:
    - a. Cooper Wiring Devices, Peachtree City, GA www.cooperwiringdevices.com.
    - b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
    - c. Hubbell Building Automation, Austin, TX www.hubbell-automation.com.
    - d. Hubbell Inc, Milford, CT www.hubbell-wiring.com or Hubbell Canada Inc, Pickering, ON (800) 263-4622 or (905) 839-4332.
    - e. Hunt Control Systems Inc, Fort Collins, CO www.huntdimming.com.
    - f. Intermatic Inc, Spring Grove, IL www.intermatic.com.
    - g. IR-TEC America, Inc., Brea, CA www.irtec.com/en-ira/.
    - h. Leviton Manufacturing Co, Little Neck, NY www.leviton.com or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
    - i. Legrand, West Hartford, CT www.legrand.us.com or Vaughan, ON www.legrand.ca.com.
    - j. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
    - k. Ortronics, New London, CT www.ortronics.com.
    - Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric, Mississauga, ON (800) 951-5526 or (905) 890-5956.
    - m. Pass & Seymour, Syracuse, NY www.passandseymour.com or Pass & Seymour Canada Inc, Concord, ON (905) 738-9195.
    - n. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
    - o. Red Dot div of Thomas & Betts, Memphis, TN www.tnbcom.
    - p. Schneider Electric North America, Palatine, IL www.schneider-electric.com (847) 397-2600.
    - q. Sensorswitch, Wallingford, CT www.sensorswitch.com.
    - r. Siemon Company, Watertown, CT www.siemon.com.
    - s. Square D Co, Palatine, IL www.squared.com.
    - t. Suttle, Hector, MN www.suttleonline.com.
    - u. Tork Inc, Mount Vernon, NY www.tork.com.
    - v. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
  - 2. Product Options:
    - a. Faces shall be nylon where available.
    - b. Devices of single type shall be from same Manufacturer.
    - c. Devices are listed as white. Use white devices on light colored walls, brown on dark colored walls, and black on black walls.

## B. Switches:

- 1. Furnace Disconnect:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

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- 1) 20 AMP, single pole:
  - a) Cooper: 2221V.
  - b) Hubbell: HBL1221-I.
  - c) Pass & Seymour: 20AC1-I.
  - d) Leviton: 1221-21.
- 2. Standard Style:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) 20 AMP, single pole:
      - a) Cooper: 2221V.
      - b) Hubbell: HBL1221-I.
      - c) Pass & Seymour: 20AC1-I.
      - d) Leviton: 1221-21.
    - 2) Two Pole:
      - a) Cooper: 2222V.
      - b) Hubbell: HBL1222-I.
      - c) Pass & Seymour: 20AC2-I.
      - d) Leviton: 1222-21.
    - 3) Three Way:
      - a) Cooper: 2223V.
      - b) Hubbell: HBL1223-I.
      - c) Pass & Seymour: 20AC3-I.
      - d) Leviton: 1223-21.
    - 4) Four Way:
      - a) Cooper: 2224V.
      - b) Hubbell: HBL1224-I.
      - e) Pass & Seymour: 20AC4-I.
      - d) Leviton: 1224-21.
    - 5) Pilot Switch:
      - a) Hubbell: HBL1221-PL.
      - b) Pass & Seymour: 20AC1-RPL.
      - c) Leviton: 1221-PLR.
    - 6) Lighted Toggle Switch:
      - a) Single Pole:
        - (1) Cooper: 2221-LTV.
        - (2) Hubbell: HBL1221-IL.
        - (3) Pass & Seymour: 20AC1-ISL.
        - (4) Leviton: 1221-LHI.
      - b) Three Way:
        - (1) Cooper: 2223-LTV.
        - (2) Hubbell: HBL1223-IL.
        - (3) Pass & Seymour: 20AC3-ISL.
        - (4) Leviton: 1223-7LC.
- 3. Exhaust Fan Timer Switches:
  - Serving Area:
    - 1) 0-60 minute, no hold position.
    - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Intermatic: FD60MWC.
      - b) Paragon: SWPD60M-W.
      - c) Tork: A560MW.
  - b. Font:
    - 1) 0-4 Hour, no hold position.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Intermatic: FDHW.
      - b) Tork: A504HW.
  - c. Custodian Room:
    - 1) 24-hour, in-wall, multiple automatic ON-OFF settings.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Intermatic: E1020.
      - b) Tork: 701A.
- 4. Digital Time/Timer Switch:
  - a. As shown in small Storage, Mechanical and Electrical Rooms.
  - b. Automatic countdown type:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) Leviton: LTT60-1L.
- b) Hubbell: TD200.
- c) Pass & Seymour: RT1W.
- d) Tork: SSA100.
- e) Watt Stopper: TS-400-W.
- 5. Dimmer Switches:
  - a. Vertical slide control with faceplate.
  - b. Preset, ON-OFF switch, 1000VA.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Hubbell: AS101/AS1I.
    - 2) Hunt: DAP-10-IV.
    - 3) Leviton: IPI10-I.
    - 4) Lutron: N-1003P-IV.
    - 5) Pass & Seymour: 91180-I.
    - 6) Phillips: MP1000-I.
    - 7) Watt Stopper: AD-1103-I.
- 6. Momentary Switches:
  - a. 15 AMP, specification grade.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: 1895W.
    - 2) Hubbell: HBL1556W.
    - 3) Legrand: 1250W.

#### C. Receptacles:

- 1. Standard Style:
  - a. 15 AMP, specification grade, back and side wired, self grounding, tamper resistant.
  - b. Verified by UL to meet Fed Spec WC-596F.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: TR5262.
    - 2) Hubbell: BR20.
    - 3) Leviton: TBR20.
    - 4) Pass & Seymour: TR20.
- 2. Range Receptacle:
  - a. Three pole, four wire grounding, 125 / 250 V, NEMA 14-50R, 50 AMP complete with plate.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: 1258.
    - 2) Hubbell: HBL9450A.
    - 3) Leviton: 279.
    - 4) Pass & Seymour: 3894.
- 3. Ground Fault Circuit Interrupter (GFCI):
  - a. 15 AMP, specification grade.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: GF15W.
    - 2) Hubbell: GF5252WA.
    - 3) Leviton: 8599-W.
    - 4) Pass & Seymour: 1594-W.

## D. Plates:

- Standard Cover Plates:
  - a. Office / Occupied Areas:
    - 1) Nylon or high impact resistant thermoplastic.
    - 2) Color shall match wiring device.
  - b. All Other: Steel.
  - c. Ganged switches shall have gang plates.
  - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Cooper.
    - 2) Hubbell.
    - 3) Leviton.
    - 4) Pass & Seymour.
- 2. Weatherproof In-Use Receptacle Covers:
  - a. NEMA 3R rated.
  - b. Cast aluminum.
  - c. Compatible with GFCI receptacles.

- d. Complete with weather resistant gaskets and stainless steel screws.
- e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Hubbell: WP26MH, horizontal; WP26M, vertical.
  - 2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
  - 3) Red Dot: CKMG, horizontal; CKMGV, vertical.
- E. Occupancy Sensors:
  - 1. Ceiling, ultrasonic type.
    - a. Complete with sensor and combined relay / control transformer.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - Cooper Controls:
        - a) Sensor: OAC-U-0501-R.
        - b) Relay / Transformer: SP20-MV.
      - 2) IR-TEC America:
        - a) Sensor: OS-361DT.
        - b) Relay / Transformer: PPU-300.
      - 3) Leviton:
        - a) Sensor: OSC05-RUW.
        - b) Relay / Transformer: OPP20-D2.
      - 4) Sensorswitch:
        - a) Sensor: CMPDT9.
        - b) Relay / Transformer: MP-20-SP0DM.
      - 5) Watt Stopper:
        - a) Sensor: W-500A.
        - b) Relay / Transformer: BZ-150.
    - c. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.
  - 2. Ceiling, passive infrared type.
    - a. Complete with sensor and relay / transformer.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Cooper Controls:
        - a) Sensor: OAC-P-1500-R.
        - b) Relay / Transformer: SP20-MV.
      - 2) IR-TEC America:
        - a) Sensor: OS-361.
        - b) Relay / Transformer: PPU-300.
      - 3) Leviton:
        - a) Sensor: OSC15-RIW.
        - b) Relay / Transformer: OPP20-D2.
      - 4) Sensorswitch:
        - a) Sensor: CM10.
        - b) Relay / Transformer: MP-20-SP0DM.
      - 5) Watt Stopper:
        - a) Sensor: CI-205.
        - b) Relay / Transformer: BZ-150.
        - c)
    - c. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.
  - 3. Ceiling, dual technology type.
    - a. Complete with sensor and relay / transformer.
    - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - Cooper Controls:
        - a) Sensor: OAC-DT-0501-R.
        - b) Relay / Transformer: SP20-MV.
      - 2) IR-TEC America:
        - a) Sensor: OS-361DT.
        - b) Relay / Transformer: PPU-300.
      - 3) Leviton:
        - a) Sensor: OSC05-RMW.
        - b) Relay / Transformer: OPP20-D2.
      - 4) Sensorswitch:
        - a) Sensor: CMPDT9.
        - b) Relay / Transformer: MP-20-SP0DM.

- 5) Watt Stopper:
  - a) Sensor: DT-305.
  - b) Relay / Transformer: BZ-150.
- Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.
- 4. Wall switch, passive infrared type.
  - a. Features include sensitivity and time delay adjustments.
  - b. Manual ON / auto OFF capability.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper Controls: OSW-P-1001-MV-W.
    - 2) IR-TEC America: LbS-700NW.
    - 3) Leviton: ODS10-IDW.
    - 4) Sensorswitch: WSD-V-WH.
    - 5) Watt Stopper: PW-100-W.
- F. Surge Protective Device (for landscape irrigation controller):
  - 1. Type 3 as defined in UL 1449 and approved for exterior application.
  - 2. Parallel metal oxide varistors, MOV, from each line to ground: 120 / 240 VAC. UV resistant construction with epoxy encapsulation of electrical connections.
  - 3. Include 1/2 inch mounting nipple and locknut.
  - 4. Category Four approved Products. See Section 01 6200 for definitions of Categories:
    - a. ASZ175B1 by Cooper Power Systems.
    - b. AG2401C by Intermatic.
    - c. 54175-SSA by Leviton.
    - d. TDS120XR50S by Square D.

### 3.1 INSTALLATION

- A. Install devices flush with walls, straight, and solid to box.
- B. Label dimmer switch groupings with 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letter shall be 1/4 inch high.
- C. Install surge protective device in knock-out of junction box installed on bottom of automatic sprinkler controller.

## END OF SECTION

WIRING DEVICES - 5 - 26 2726

# SECTION 26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Disconnects: Same as Manufacturer of Project's main panelboard.
    - b. Fuses
      - 1) Cooper Bussmann, Ellisville, IL www.cooperbussmann.com.
      - 2) Edison Fuse, Ellisville, IL (314) 391-3443.
      - 3) Ferraz Shawmut, Newburyport, MA www.ferrazshawmut.com.
      - 4) Littelfuse Inc, Des Plaines, IL www.littelfuse.com.

## B. Disconnects:

- 1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
- 2. Provide interlock to prevent opening of door when switch is in ON position.
- 3. Provide means to lock switch in OFF position with padlock.
- 4. Disconnects for motor circuits shall be horsepower rated.
- 5. Disconnects For Furnace Units And Unit Heaters: Provide manual starter with thermal overload relay. Provide overload relay to match motor full load amps.
- 6. Enclosures:
  - a. Interior: NEMA / CEMA Type 1.
  - b. Exterior: NEMA / CEMA Type 3R.
- 7. Fuses:
  - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
  - b. Fuses on Project shall be from single manufacturer.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Use 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high. Attach labels with screws
- B. Install furnace disconnects on furnace at location where it is accessible from front of unit and it does not interfere with unit's operation.

# SECTION 26 4100 FACILITY LIGHTNING PROTECTION

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install lightning protection system as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 7226: 'Ridge Vent' for lightning rod attached to ridge vent.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for sealing around air terminal washer.
  - 3. Section 10 7430: 'Aluminum Steeple'.
  - 4. Section 26 0501: 'Common Electrical Requirements'.
  - 5. Section 26 4301: 'Surge Protective Devices'.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Lightning Rod Cover Plate.
- D. Related Requirements:
  - 1. Section 07 7226: 'Ridge Vent' for lightning protection system attached to 'Lightning Rod Cover Plate'.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. National Fire Protection Association:
    - NFPA (Fire) 780, 'Standard for the Installation of Lightning Protection Systems' (2014 or latest approved edition).

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Show layout of system on building, installation details, and items to be used in system.
    - Show roof locations and spacing of air terminals to be attached to 'Lightning Rod Cover Plate' as specified in Section 07 7226.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Comply with latest edition of NFPA 780 and other local governing codes.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Type One Acceptable Manufacturers:
  - 1. Advanced Lightning Technology, Argyle, TX www.altfab.com.
  - 2. Erico International, Solon, OH www.erico.com.
  - 3. Harger Lightning And Grounding, Grayslake, IL www.harger.com.
  - 4. Independent Protection Company (IPC), Goshen, IN www.ipclp.com.

- 5. Preferred Lightning Protection, Maryville, MO www.preferredlp.com.
- 6. Robbins Lightning Protection Company, Maryville, MO www.robbinslightning.com.
- 7. Thompson Lightning Protection, St Paul, MN www.tlpinc.com.
- 8. VFC Inc, Woods Cross, UT www.vfcinc.com.
- 9. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Components:

- 1. Lightning protection equipment provided under this Section shall be from same manufacturer.
- 2. Lightning protection equipment provided for Steeple / Tower under this Section:
  - a. Class One Quality Standards:
    - 1) Smooth weave copper cable, minimum 32 strands of 17 gauge: IPC No. 32S.
    - 2) Bronze ground clamps for 3/4 inch rod: IPC No. 52A.
    - 3) 3/4 inch by 10 foot ground rods, copperclad: IPC No. 579.
    - 4) Bonding Plate:
      - a) Aluminum for connection to aluminum steeple / tower elements: IPC No. A283B.
      - b) Bronze for connection to steel steeple / tower elements: IPC No. 238B.
    - 5) Pressure Cable Clamp: IPC No. 297A.
    - 6) Cable Loop Fastener, copper: IPC No. 121A.
    - 7) Right Angle Through-Roof Connector:
      - a) IPC No. 597X, bronze, for use with copper cable in steeple / tower.
      - b) IPC No. A597X, aluminum, for use with aluminum cable in steeple / tower.
    - 8) Inspection / test well: Robbins Lightning, Inc. No. 89C-18.
- 3. Lightning protection equipment attached to ridge vent.
  - a. Class One Quality Standards:
    - Air terminal (blunt tip): 1/2 inch x 12 inches long solid aluminum quality standard IPC No. A331 -BT.
    - 2) Stainless steel nut.
    - 3) Stainless steel washer and neoprene washer.
    - 4) Bronze ground clamps for 3/4 inch rod: IPC No. 28U.
    - 5) Smooth weave copper cable, minimum 32 strands of 17 gauge: IPC No. 32S.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with steeple / tower fabricator.
  - 2. Coordinate with ridge vent installation.

## B. Ground Rods:

- 1. Install ground rods 3 feet minimum away from building or any part of building. Drive each rod until top is a minimum of one foot below finish grade.
- 2. Connect cable to ground rods with ground clamps.
- 3. Over each ground rod, install inspection / test well with cover flush with finish grade.

#### C. Cable:

- 1. Install lightning cable with continuous horizontal or downward course, free from down and up pockets.
- 2. Radius of bends shall not be less than 8 inches and never tighter than 90 degree angle.
- 3. Install cable supports every 36 inches along run through building using specified cable fasteners.
- 4. Bond lightning protection system to building grounding system.
- 5. Lightning Rod Cover Plate:
  - a. Follow Ridge Vent Manufacturer's written instructions including:
  - Attach conductor cable and air terminal to 'Lightning Rod Cover Plate' specified in Section 07 7226: 'Ridge Vents' at locations as per Shop Drawings Submittal.
  - c. Apply elastomeric joint sealant as specified in Section 07 9213 around washer.
  - d. Hook side of 'Lightning Rod Cover Plate' without conductor cable to bottom of ridge vent and rotate into place.
  - e. Install conductor cable typically behind deflector.
  - f. Fasten 'Lightning Rod Cover Plate' to Ridge Vent with four (4) zip screws provided by Ridge Vent Manufacturer as shown written instructions.

g. Follow same procedure for rest of 'Lightning Rod Cover Plates' as shown on Shop Drawings.

## SECTION 26 4301 SURGE PROTECTIVE DEVICES

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install surge protective devices as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 0526: 'Grounding And Bonding For Electrical Systems'.
  - 3. Section 26 2417: 'Circuit-Breaker Panelboards'.
  - 4. Section 26 4100: 'Facility Lightning Protection'.

#### 1.2 REFERENCES

- A. Abbreviations And Acronyms:
  - 1. SPD: Surge Protective Device.
- B. Association Publications:
  - 1. Institute of Electrical and Electronic Engineers:
    - IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits'.
    - b. IEEE C41.2-2002, 'Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits'.
    - c. IEEE C62.45-2002, 'Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits'.
  - 2. National Electrical Contractors Association:
    - a. NECA 1-2015, Standard for Good Workmanship in Electrical Contracting'.
- C. Reference Standards:
  - 1. Military Standard:
    - a. MIL-STD-220C, 'Method of Insertion Loss Measurement' (2009).
  - 2. National Electrical Manufactures Association:
    - a. NEMA 250-2014, 'Enclosures for Electrical Equipment (1000 Volts Maximum)'.
    - b. NEMA LS-1-1992(R2000), 'Low-Voltage Surge-Protection (LVSP) Devices' (Withdrawn August 19, 2009).
  - 3. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 70-2014 (or most recent edition adopted by AHJ including all applicable amendments and supplements), National Electric Code (NEC).
  - 4. Underwriters Laboratories:
    - a. UL 1449: 'Surge Protective Devices' (4th Edition or current edition including all Revisions).

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - Coordinate size and location of over current device compatible with actual surge protective and location to be installed
  - Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

#### 1.4 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
  - a. Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

#### B. Informational Submittals:

- 1. Manufacturer Instructions:
  - a. Provide Manufacturer's written installation instructions for Surge Protection Devices (SPD).
- 2. Manufacturer Reports:
  - a. Manufacturer's documentation for compliance with following standards:
    - 1) UL 1449: 'Surge Protective Devices'.
  - b. Test Reports:
    - Provide test reports from Independent Testing Laboratory verifying COMPLETE SPD will survive published and specified maximum surge current rating:
      - a) Test reports will clearly show that all components that make up COMPLETE system were included in these tests (including but not limited to all necessary fuses, thermal disconnects, integral disconnects, and monitoring systems).
      - b) Testing shall be performed as described in NEMA LS-1 document.
      - c) Less than 10 percent change in protective characteristics from pre to post test.
    - 2) Provide test data confirming that SPD will survive published and specified repetitive surge current rating (longevity characteristics).
    - 3) Per requirements of NEC Article 285.6, provide test data demonstrating that SPD is without use of external fusing.
    - 4) Provide COMPLETE set of test and ratings data per recommendations of NEMA LS-1.
- 3. Qualification Statement:
  - a. Provide Manufacturer Qualification documentation if requested by Architect.

#### C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Final, executed copy of Warranty.
  - b. Record Documentation:
    - 1) Record actual connections and locations of surge protective devices.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. General:
    - a. Conform to requirements of NFPA 70.
    - b. Referenced Documentation:
      - 1) Maintain at project site copy of each referenced document that prescribes execution requirements.
    - c. SPD shall:
      - 1) Bear UL 1449 current edition.
        - a) 'Manufactured in accordance with' is not equivalent to UL listing and does not meet intent of this specification.
      - Performance parameters shall be posted at www.UL.com under Category Code: VZCA. Products or parameters with posing at UL.com shall not be approved.
  - 2. Qualifications:
    - a. Manufacturer Qualifications:
      - 1) Company specializing in manufacturing products specified in this section with three (3) years minimum documented experience.

## 1.6 WARRANTY

- A. Manufacturer's Warranty:
  - 1. Provide ten (10) year minimum warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.
    - a. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

#### PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

#### A. Manufacturers:

- 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
  - a. Source Limitations: Furnish surge protective devices produced by single manufacture and obtained from single supplier.
  - b. Field-Installed, Externally Mounted Surge Protective Devices:
    - 1) Advanced Protection Technologies, Inc. (APT), Clearfield, FL www.aptspd.com.
    - 2) Current Technology by Thomas & Betts Power Solutions, Richmond, VA www.tnbpowersolutions.com.
    - 3) Emerson Network Power, Binghamton, NY www.emersonnetworkpower.com.
    - 4) GE Industrial Solutions (Division of GE), Plainville, CT www.geindustrial.com.
    - 5) Atlantic Scientific Corporation, Melbourne FL www.atlanticsceientific.com.
    - MTL Instruments Group, (Division of Cooper Crouse-Hinds), Great Marlings, Butterfield, Luton, UK www.mtl-inst.com.
    - 7) Schneider Electric, North American Division, Palatine, IL www.surgelocic.com.

#### B. Components:

- 1. Surge Protective Devices:
  - a. Description:
    - Factory assembled surge protective devices (SPD) for 60 Hz service, listed and classified by UL suitable for purpose specified and indicated; system voltage as indicated on Contract Drawings.
  - b. Design Criteria:
    - 1) Capable of surviving 6,000 ANSI/IEEE C62.41, Category C3 (10kA) impulses without failure or performance degradation of more than ten (10) percent.
    - 2) Integrally fused to pass requirements of UL 1449 and provide short circuit current rating of 200kAIC:
      - a) Each MOV shall be individually matched to + or volt and individually fused.
      - b) LED indicator lights for power and protection status.
      - c) Audible alarm, with silencing switch, to indicate when protection has failed.
      - d) One (1) set of dry contacts rated at 5A and 250-V, ac, for remote monitoring of protection status.
  - c. Protected Modes:
    - 1) Wye Systems: L-N, L-G, N-G, L-L.
  - d. Voltage Protection Ratings (VPR's) as per UL 1449:
    - 1) 208Y/120V System Voltage:
      - a) Not more than 800 V for L-G, L-G, and N-G modes and 1,200 V for L-L mode.
    - 2) 480Y/277V System Voltage:
      - a) Not more than 1,500 V for L-G, L-G, and N-G modes and 2,000 V for L-L mode.
  - e. Maximum Continuous Operating Voltage (MCOV) as per UL 1449:
    - 1) Not less than one hundred fifteen (115) percent on nominal system voltage.
  - f. Enclosure Environment Type as per NEMA 250:
    - 1) Unless otherwise indicated, as specified for following installation locations:
      - a) Indoor clean, dry locations: Type 1.
      - b) Outdoor locations: NEMA 4 enclosure.
  - g. Mounted For Field-Installed, Externally Mounted SPD's: Unless otherwise indicated, as specified for following locations:
    - Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
    - 2) Provide flush-mounted SPD where mounted in public areas or adjacent to flush-mounted equipment.
- 2. Surge Protective Devices For Service Entrance Locations:
  - a. General:
    - 1) Provide field-installed, externally mounted SPD's.
  - b. Design Criteria:
    - 1) List and label as complying with UL 1449, Type 1.
    - 2) Provide SPD's utilizing field-replaceable modular or non-modular protection circuits.
    - 3) Surge Current Rating:
      - a) Not less than 125 kA per mode/250 kA per phase.
    - 4) Repetitive Surge Current Capacity: Not less than 5,000 impulses.
    - 5) Nominal Discharge Current (I-n) as per UL 1449: 20 kA.
    - Short Circuit Current Rating (SCCR) as per UL:
      - a) Not less than available fault current at installed location as indicated on Contract Drawings.
  - c. Diagnostics:

- 1) Protection Status Monitoring:
  - a) Provide indicator lights to report protection for each phase.
- 2) Alarm Notification:
  - a) Provide indicator light and audible alarm to report alarm condition.
  - ) Provide button to manually silence audible alarm.
- d. Provide surge rated integral disconnect switch for SPD's not connected to dedicated circuit breaker or fused switch or not direct bus connected.

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify field measurements are as shown on Contract Drawings.
  - 2. Verify service voltage and configuration marked on SPD are consistent with service voltage and configuration at Project location.
  - 3. Verify electrical equipment is ready to accept connection of SPD and that installed overcurrent device is consistent with requirements of Contract Drawings and Manufacturer's written Instructions.
  - 4. Verify system grounding and bonding is in accordance with Section 26 0526: 'Grounding And Bonding For Electrical Systems' including bonding of neutral and ground for service entrance and separately derived systems where applicable.
  - 5. Verify conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION

- A. General:
  - 1. Perform work in neat and workmanlike manner in accordance with Standard Practice Guidelines of NECA 1.
- B. Install SPD in accordance with Manufacturer's written instructions.
- C. Arrange equipment to provide minimum clearances in accordance with Manufacturer's written Instructions and NFPA 70.
- D. Unless indicated otherwise, connect service entrance surge protective device on line side of service disconnect main overcurrent device.
- E. Conductors:
  - 1. Proved conductors with minimum ampacity as indicated on Contract Drawings, as required by NFPA 70, and not less than Manufacturer's recommended minimum conductor size.
  - 2. Install between SPD and equipment terminations as short and straight as possible, not exceeding Manufacturer's recommended maximum conductor length.
    - a. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible.
    - b. Twist conductors together to reduce inductance.
- F. Energizing SPD's:
  - Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526: 'Grounding And Bonding For Electrical Systems' where applicable.
  - 2. Replace SPD's damaged by improper or missing neutral-ground bond.

#### 3.3 FIELD QUALITY CONTROL

- A. Field Testing:
  - 1. Provide factory testing documents.
  - 2. Verify electrical wiring installation complies with Manufacturer's written installation requirements.
  - 3. Disconnect SPD prior to performing any high potential testing.
  - 4. Replace SPD's damaged by performing high potential testing with SPD connected.

## SECTION 26 5100 INTERIOR LIGHTING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install lighting system as described in Contract Documents, complete with lamps.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 5121: 'Interior Lighting: LED Dimming Drivers'.
- C. Reference Standards:
  - 1. American National Standards Institute (ANSI):
    - ANSI C78.377-2015, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
  - 2. Federal Communications Commission (FCC):
    - a. Code of Federal Regulations (CFR):
      - 1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.
  - 3. Institute of Electrical and. Electronics Engineers (IEEE):
    - a. IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.

#### PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Advance Transformer Co, Rosemont, IL www.advancetransformer.com.
    - b. Cooper Wiring Devices by Eaton, Peachtree City, GA www.cooperindustries.com.
    - c. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
    - d. Howard Lighting Products, Laurel, MS www.howard-ind.com.
    - e. Novitas Inc, Peachtree City, GA www.novitas.com.
    - f. Osram Sylvania, Danvers, MA www.sylvania.com or Osram Sylvania Ltd, Mississauga, ON (905) 673-6171.
    - g. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
    - h. Universal Lighting Technologies, Nashville, TN www.universalballast.com.
    - i. Venture Lighting International, Solon, OH www.venturelighting.com.
    - j. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
    - k. Westinghouse Lighting Corp, Philadelphia, PA www.westinghouselightbulbs.com.
  - 2. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.

#### B. Materials

- 1. Lighting Fixtures:
  - a. Type One Acceptable Products:
    - 1) See Fixture Schedule on Drawings for acceptable manufacturers and models.
    - 2) Equals as approved by Architect before bidding. See Section 01 6200.
- 2. Fluorescent Ballasts:
  - a. Energy saving electronic for T8 lamps:
    - 1) Program rapid start type.
    - 2) Parallel circuit type.

- 3) Minimum power factor of 95 percent.
- 4) Maximum total harmonic distortion of 10 percent.
- 5) Operation of lamps in compliance with Lamp Manufacturer's recommendations.
- 6) Minimum starting temperature 0 deg F for T8 lamps.
- 7) Class A sound rating.
- 8) Transient protection in accordance with IEEE / ANSI C62.41.1, Category A.
- 9) Comply with FCC 47 CFR Part 18.
- 10) Ballast factor of 0.78.
- 11) Maximum crest factor of 1.7.
- 12) Five year full replacement warranty including labor allowance for replacement.
- 13) Input voltage to match system voltage.
- 14) Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
  - a) IOP2PSP32LWSC by Advance.
  - b) GE32-MVPS-L by General Electric.
  - c) QHE-UNV-PSX-SC by Osram / Sylvania.
- 3. Fluorescent Dimming Ballasts:
  - a. Electronic for T8 lamps:
    - 1) Programmed rapid start type.
    - 2) Series circuit type.
    - 3) Minimum power factor of 95 percent.
    - 4) Maximum total harmonic distortion of 20 percent.
    - 5) Operation of lamps in compliance with Lamp Manufacturer's recommendations.
    - 6) Minimum starting temperature 60 deg F.
    - 7) Class A sound rating.
    - 8) Transient protection in accordance with IEEE / ANSI C62.41.1, Category A.
    - 9) Comply with FCC 47 CFR Part 18.
    - 10) Maximum crest factor of 1.7.
    - 11) Five year full replacement warranty including labor allowance for replacement.
    - 12) Input voltage to match system voltage.
    - 13) Compatible with 0-10 VDC two-wire slide dimmer controller.
    - 14) Category Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) VZT-3S32 by Advance.
      - b) B332SSR77V5 by Universal Lighting Technologies.
      - c) QTP3x32T8/277 DIM5-Q by Osram / Sylvania.

## 4. Lamps:

- a. T8 Fluorescent Lamps:
  - 1) Minimum initial output of 3100 Lumens.
  - 2) Rated life of 40,000 hrs at 3 hrs per start for lamps operated on instant start ballasts.
  - 3) Minimum CRI 85.
  - 4) Meet Federal TCLP criteria.
  - 5) Category Four approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a) General Electric.
    - b) Howard.
    - c) North American Philips.
    - d) Osram / Sylvania.
  - Correlated Color Temperature: 3000k.
- b. Other Lamps:
  - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a) General Electric.
    - b) North American Philips.
    - c) Osram / Sylvania.
    - d) Westinghouse.
- c. LED Lamps and Fixtures:
  - 1) Replacement Lamps shall have minimum efficiency of 70 lm / W per LM 79.
  - 2) Integral LED Lamps shall have minimum efficiency of 90 lm / W per LM 79.
  - 3) Provide minimum rated life of 50,000 per LM 80 and LM 70 standards.
  - 4) Color Temperature: 3000k.
  - 5) Provide full spectrum color index of 65.
- 5. Daylight Lighting Switching System:
  - a. Complete system enabling control of up to six 277V circuits by daylighting photocell mounted in skylight.
  - System components include, but are not limited to, following items. Except for photocell, install components in single, locking enclosure:

INTERIOR LIGHTING - 2 - 26 5100

- 1) 20 to 2000 foot candle photocell with necessary mounting hardware.
- 2) Control relays or contactors and transformers for up to six circuits
- 3) Sensor controller with HIGH, LOW, and DEAD BAND adjustments.
- c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1) Cooper Lighting.
  - 2) Watt Stopper.

#### C. Factory Assembly:

 Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Interface With Other Work:
  - 1. Coordinate with Sections under 09 5000 heading to obtain symmetrical arrangement of fixtures in acoustic tile ceiling as shown on Reflected Ceiling Plan in Contract.
  - 2. Coordinate with Sections under 09 9000 heading to ensure that light coves are properly painted before installation of light fixtures.
  - 3. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.
- B. Securely mount fixtures. Support fixtures weighing 50 lbs or more from building framing or structural members.
- C. Fasten lay-in fluorescent fixtures to ceiling suspension system on each side with bolts, screws, rivets, or clips. In addition, connect lay-in fixtures with two (2) No. 12 gauge diagonal wires with three (3) turns each end; two (2) per fixture minimum to building framing or structural members. Connect to opposing corners of fixture. Wires may be slightly slack. Make final conduit connections to lay-in fluorescent fixtures with specified flexible conduit or flexible fixture whips.
- D. Where fluorescent fixtures are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.
- E. Where recessed fixtures are to be installed, provide openings, plaster rings, etc, of exact dimensions for such fixtures to be properly installed. Coordinate fixture installation with ceiling type and thickness. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with specified flexible conduit.
- F. Verify operation of track lighting system in Cultural Center, then remove and store track lighting fixtures as directed.
- G. Do not locate incandescent fixtures in closet or storage areas within 18 inches and fluorescent fixtures within 6 inches of shelves.

#### 3.2 ADJUSTMENT

A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

## END OF SECTION

INTERIOR LIGHTING - 3 - 26 5100

# SECTION 26 5121 INTERIOR LIGHTING: LED Dimming Drivers

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install Interior Lighting LED Dimming Drivers as described in Contract Documents, complete with lamps
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 0924, 'Lighting Control System'.
  - 3. Section 26 2726: 'Wiring Devices'.
  - 4. Section 26 5100: 'Interior Lighting'.

#### C. Reference Standards:

- 1. American National Standards Institute (ANSI) / American National Standard Lighting Group (ANSLG):
  - ANSI/ANSLG C78.377-2011, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
  - b. ANSI/ANSLG C82.11-2011, 'High-Frequency Fluorescent Lamp Ballasts'.
- 2. American National Standards Institute (ANSI) / Illuminating Engineering Society (IES):
  - a. ANSI/IES RP-16-10, 'Nomenclature and Definitions for Illuminating Engineering'.
- 3. Federal Communications Commission (FCC):
  - a. Code of Federal Regulations (CFR):
    - 1) FCC 47 CFR Part 15, 'Class B: Radio Frequency Devices'.
- 4. Institute of Electrical and. Electronics Engineers (IEEE) / American National Standards Institute (ANSI):
  - a. IEEE/ANSI C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.
- 5. International Electrotechnical Commission (IEC):
  - a. IEC 60929 ED. 4.0 B:2011. 'AC and/or DC Supplied Electronic Control Gear for Tubular Fluorescent Lamps Performance Requirements'.
  - b. IEC 61000-3-2:2005, 'Electromagnetic Compatibility (EMC) Part 3-2: Limits for Harmonic Current Emissions (Equipment Input Current <= 16 A per phase)'.
  - c. IEC 61347-1 ED. 2.2 B:2012, 'Lamp Controlgear Part 1: General and Safety Requirements'.
  - d. IEC 61347-2-13 ED. 1.0 B:2006, 'Lamp Controlgear Part 2-13: Particular Requirements for d.c. or a.c. Supplied Electronic Controlgear for LED modules'.
  - e. IEC 61547 ED. 2.0 B:2009, 'Equipment for General Lighting Purposes EMC Immunity Requirements'.
  - f. IEC 62384:2006, 'D.C. or A.C. Supplied Electronic Control Gear for LED Modules Performance Requirements'.
  - g. IEC 62386-101 ED.1.0 B:2009, 'Digital Addressable Lighting Interface Part 101: General Requirements System'.
- 6. National Electrical Manufacturers Association (NEMA):
  - a. NEMA 410-2011, 'Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts'.
- 7. Underwriters Laboratories (UL):
  - a. UL 1310: 'Class 2 Power Units' (2011).
- 8. Underwriters Laboratories (UL) / Underwriters Laboratories of Canada (ULC):
  - a. UL 8750: 'Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products' (2009).

## 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's published product data on dimensions, ratings, catalog numbers and identification of products and accessories for products included for project. Include performance data.
  - 2. Shop Drawings:

- a. Provide fixture type(s) list for each specific driver.
- b. Provide wiring diagrams as needed for special operation or interaction with other system(s).

#### B. Informational Submittals:

- 1. Qualification Statements:
  - a. Manufacturer: Provide experience compliance documentation.
  - b. Products: Provide compliance documentation with UL / ULC requirements.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty on drivers.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet UL / ULC requirements.
- B. Qualifications. Requirements of Section 01 4301 applies but not limited to following:
  - 1. Manufacturer:
    - a. Manufacture with five (5) years experience in manufacture of dimmable electronic lighting drivers.
    - b. Provide experience documentation.

### 1.4 FIELD CONDITIONS

- A. Ambient Conditions:
  - General:
    - a. Proceed with installation only when following ambient conditions can be maintained:
      - 1) Install when the temperature is between minus 4 deg F minimum and 122 deg. F maximum and relative humidity is ninety (90) percent, non-condensing.
      - 2) Protect from dust and excess moisture during installation.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide five (5) year warranty on drivers to operate driver at or below required driver warranty temperature.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. eldoLED America, San Jose, CA www.eldoled.com.
    - b. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
    - c. Howard Lighting Products, Laurel, MS www.howard-ind.com.
    - d. OSRAM Sylvania, Danvers, MA or OSRAM Sylvania LTD, Mississauga, Ontario Canada www.Sylvania.com.
    - e. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
- B. LED Dimming Driver:
  - 1. Description:
    - a. LED Dimming Driver:
      - 1) 4 wire (010V DC Voltage Controlled) Dimming Drivers.
      - 2) Digital (DALI Low Voltage Controlled) Dimming Drivers.

- 3) Integral Diming Driver for replacement lamp.
- 2. Design Criteria:
  - a. Driver:
    - 1) Driver must be able to operate for (+/- 10 percent) supply voltage of 120V through 277VAC at 60Hz.
    - Driver to be UL / ULC recognized under component program and shall be modular for simple field replacement. Drivers that are not UL / ULC recognized or not suited for field replacement will not be used.
    - 3) Driver shall have ability to provide no light output when analog control signal drops below 0.5 V, or DALI digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.
  - b. Range and Quality:
    - 1) LED dimming to be equal in range and quality to commercial grade incandescent dimmer:
      - a) Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in commercial environment.
    - Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
  - c. Inrush Current:
    - 1) Driver must limit inrush current as followings:
      - a) Minimum Requirement: Meet or exceed NEMA 410 driver inrush standard of 430 amps per 10 amps load with maximum of 370 amps<sup>2</sup> per second.
      - b) Preferred Requirement: Meet or exceed 30mA<sup>2</sup>s at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.
  - d. Withstand up to 1,000 volt surge without impairment of performance as defined by IEEE/ANSI C62.41.1 Category A.
  - e. Light Output:
    - 1) No visible change in light output with variation of plus/minus 10 percent line voltage input.
  - f. Harmonic Distortion:
    - 1) Total Harmonic Distortion less than 20 percent and meet ANSI/ANSLG C82.11 maximum allowable THD requirements at full output.
    - 2) THD shall at no point in dimming curve allow imbalance current to exceed full output THD.
  - g. Automatic Adaptation:
    - 1) Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance.
      - a) Adjustment of forward LED voltage, supporting 3V through 55V.
      - b) Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1 mA.
      - c) Adjustment for operating hours to maintain constant lumens (within 5 percent) over 50,000 hour design life of system, and deliver up to 20 percent energy savings early in life cycle.
  - h. Light Quality:
    - Over entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 1 percent light output and step to 0 percent where indicated. Driver shall respond similarly when raising from 0 percent to 100 percent.
    - 2) Drivers to track evenly across multiple fixtures at all light levels, and shall have input signal to output light level that allows smooth adjustment over entire dimming range.
    - Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within dimming range from 100-0.1 percent luminaire shall have:
      - a) LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
      - b) Minimum Requirement: Flicker index shall less that 5 percent at all frequencies below 1000 Hz.
      - c) Preferred specification: Flicker index shall be equal to incandescent, less that 1 percent at all frequencies below 1000 Hz.
  - i. Control Input:
    - 1) 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers:
      - a) Must meet IEC 60929 ED. 4.0 B Annex E for General White Lighting LED drivers.
      - b) Connect to devices compatible with 0 to 1 OV Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at low end of 0.3V. Limit number of drivers on each 0-1 OV control output based on voltage drop and control capacity.
      - c) Control relays or contactors and transformers for up to six circuits

- d) Sensor controller with HIGH, LOW, and DEADBAND adjustments.
- 2) Digital (DALI Low Voltage Controlled) Dimming Drivers:
  - Must meet requirements of IEC 62386-101 ED.1.0 B.
- 3) Integral Dimmer Driver for replacement lamps:
  - a) LED Driver shall not cause shadows.
  - b) LED Driver shall be line voltage controlled and shall be compatible with any universal dimmer.

## 3.1 INSTALLATION

- A. Installation of driver to meet Manufacturer's prescribed methods and instructions.
- B. Meet Ambient Conditions requirements for installation.
- C. Driver may be remote mounted up to 300 ft depending on power level and wire gauge.
- D. 0-10V input shall be protected from line voltage miswire, and immune and output unresponsive to induced AC voltage on control leads.

## SECTION 26 5200 EMERGENCY LIGHTING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install emergency battery units as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

#### PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Beghelli, Miramar, FL www.beghelliusa.com.
    - b. Bodine Emergency Lighting, Collierville, TN www.bodine.com
    - c. Dual-Lite, Cheshire, CT www.dual-lite.com.
    - d. Iota Engineering Co, Tucson, AZ www.iotaengineering.com
    - e. Lightolier, Fall River, MA www.lightolier.com.
    - f. Lithonia Lighting, Conyers, GA www.lithonia.com.
    - g. McPhilben / Day-Brite Lighting, Tupelo, MS www.mcphilben.com.
    - h. Sure-Lites / Cooper Lighting, Elk Grove, IL www.cooperlighting.com.

#### B. Materials:

- 1. Fluorescent Battery Packs:
  - a. Design Criteria:
    - 1) Batteries shall be long life nickel cadmium type.
    - 2) Complete with charging indicator light and test switch.
    - 3) Components shall be fully concealed and easily accessible for maintenance or replacement.
    - 4) Factory installed in lighting fixture, or field installed to same standards.
  - b. Linear Fluorescent Lighting Fixtures:
    - 1) Battery pack shall operate one (1) lamp at approximately 600 lumens initially and 60 percent minimum of initial lumens after ninety (90) minutes.
    - 2) Charger shall be capable of full recharge in twenty four (24) hours.
  - c. Class Two Quality Products: See Section 01 4301 for Manufacturer Qualifications and Section 01 6200:
    - 1) Any Manufacturer that conforms to Contract Documents requirements.
- 2. Emergency Lighting Units And Fixtures:
  - a. Design Criteria:
    - 1) Shall operate indicated number of lamps for ninety (90) minutes of emergency operation.
    - 2) Sealed, maintenance free, lead calcium type battery.
    - 3) Painted steel housing and complete with power indicator light and test switch.
    - 4) Lamps to be designed for wet locations and with full vertical and horizontal adjustment of lamps.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - See Contract Drawings for approved fixtures. Coordinate emergency lighting unit and fixture so that systems function as required.

## 3.1 INSTALLATION

## A. Battery Packs:

- 1. General:
  - a. Wire so unit can be tested with lights on.
  - b. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.
- 2. Linear Fluorescent Lighting Fixtures:
  - a. Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.
- B. Lighting Heads:
  - 1. Aim lamps to maximize lighting of first 50 feet of egress path.
  - 2. Wire so lamps are normally off and operate upon loss of normal building power.
- C. Emergency Lighting Units:
  - 1. Aim lamps to maximize lighting of first 50 feet of egress path.
  - 2. Wire so lamps are normally off and operate upon loss of normal building power.
  - 3. Connect units to un-switched conductor of normal lighting circuit.

END OF SECTION

EMERGENCY LIGHTING - 2 - 26 5200

# SECTION 26 5600 EXTERIOR LIGHTING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install exterior lighting system as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchor bolts.
- C. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for bases for light poles and installation of anchor bolts.
  - 2. Section 26 0501: 'Common Electrical Requirements'.

#### PART 2 - PRODUCTS

## 2.1 SYSTEM

#### A. Manufacturers:

- 1. Manufacturer Contact List:
  - a. Cutler-Hammer Inc, Milwaukee, WI www.cutler-hammer.eaton.com or Cutler-Hammer/Eaton Yale Ltd, Burlington, ON (905) 333-6442.
  - b. General Electric Industrial Systems, Charlotte, NC or G E Lighting Canada Inc, Mississauga, ON www.geindustrial.com.
  - c. Intermatic Inc, Spring Grove, IL www.intermatic.com.
  - d. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric / Maple Chase, Mississauga, ON (800) 951-5526 or (905) 890-5956.
  - e. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com or Siemens Canada, Mississauga, ON (905) 819-8000.
  - f. Square D Co, Palatine, IL or Square D / Schneider Electric, Toronto, ON www.squared.com.
  - g. Tork Inc, Mount Vernon, NY www.tork.com.

## B. Materials:

- 1. Exterior Fixtures:
  - a. Finish shall be high quality polyester powder coating:
    - 1) Finish process shall consist of cleaning, electrostatically applying power coat, and thermal curing.
    - 2) Weather, scratch, UV, and fade resistant.
  - b. Color shall be Manufacturer's standard white, natural aluminum, or medium bronze as selected by Architect before bidding.
  - c. Type One Acceptable Products:
    - 1) As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
    - 2) Equals as approved by Architect before bidding. See Section 01 6200.
- 2. Parking Area Poles:
  - a. Designed for wind loading required for Project location as determined by Architect.
  - b. Aluminum hinged base type with matching aluminum anchor bolt cover secured to base.
  - c. Include hand hole with cover at pole base.
  - d. Finish And Color: Match parking area fixtures.
- 3. Exterior Lighting Control:
  - a. Photo Cell:
    - 1) 120 volts
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - a) Paragon: CW201-00.
      - b) Tork: 2101.

- b. Lighting Contactor:
  - 1) 120 volt coil, 20 amps, 2 pole, NEMA 1 enclosure.
  - 2) By same manufacturer as main panelboard.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a) Cutler Hammer: CN35.
    - b) General Electric: CR260L-21CA22.
    - c) Siemens: LEN01B200120A.
    - d) Square D: Class 8903, Type LG-20.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Interface With Other Work:
  - Coordinate location of anchor bolts and conduit in concrete bases so pole will be properly mounted and centered
    on base.
  - 2. Install hinged light pole bases so poles can be completely lowered to ground without obstruction out into parking area.
- B. Lighting Control:
  - Install time switches, manual bypass switches, and contactor inside building to control parking area and building exterior lighting. Label each component to identify lighting controlled, I.E. 'PARKING LIGHTING' or 'BUILDING LIGHTING.' Label with 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high.
  - 2. Locate photocell(s) outside building under soffit and away from any light source and direct sunlight.
  - 3. Wire photocell and time switch in series for photo cell ON, time switch OFF operation.

END OF SECTION

EXTERIOR LIGHTING - 2 - 26 5600



## **NIBLEY 12 & MENDON UTAH STAKE CENTER**

## **DIVISION 27: COMMUNICATIONS:**

27 1000 Structured Cabling

27 1116 Communications Cabinets, Racks, Frames, and Enclosures

27 1501 Communications Horizontal Cabling

27 4000 Audio-Video Communications

27 4117 Video Systems

27 5000 Distributed Communications and Monitoring Systems

27 5117 Sound System

# SECTION 27 1116 COMMUNICATIONS CABINETS, RACKS, FRAMES, AND ENCLOSURES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Selection Includes But Is Not Limited To:
  - Furnish and install communications cabinets, racks, frames, and enclosures as described in Contract Documents
- B. Related Requirements:
  - 1. Section 26 0526: 'Grounding And Bonding For Electrical Systems'.
  - 2. Section 27 1501: 'Communications Horizontal Cabling'.
  - 3. Section 27 4117: 'Video Systems'.
  - 4. Section 27 5117: 'Audio Systems'.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Cable Management, Vertical Cable Management, and Horizontal Cable Management.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. British Standards Institution (BSI):
    - a. BS EN 50310:2006, 'Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment.
  - 2. Building Industry Consulting Service International (BISCI:
    - a. Information Transport Systems Installation Methods Manual (ITSIMM) (5th Edition).
    - b. Telecommunications Distribution Methods Manual (TDMM) (12th Edition).
  - 3. Institute of Electrical and Electronics Engineers:
    - a. IEEE 802.3-2012, 'Standard for Ethernet'.
    - D. IEEE 1100-2005, 'Recommended Practice for Powering and Grounding Electric Equipment'.
  - 4. Telecommunications Industry Association:
    - a. TSB-162, 'Telecommunication Cabling Guidelines for Wireless Access Points' (March 2006).

## B. Reference Standards:

- 1. International Electrotechnical Commission:
  - a. IEC 60603-7:2011, 'Connectors for electronic equipment Part 7 'Detail specification for 8-way, unshielded, free and fixed connectors'.
- 2. International Organization for Standardization / International Electrotechnical Commission:
  - a. ISO/IEC 11801:2002/Amd 2:2010, 'Information Technology-Generic Cabling for Customer Premises'.
- 3. National Fire Protection Association:
  - a. NFPA 70–2014, 'National Electrical Code'.
- 4. Telecommunications Industry Association:
  - a. TIA-568-C.2, 'Balanced Twisted-Pair Telecommunications Cabling and Components Standards' (Revision C. 2009)
  - b. TIA-569, 'Telecommunications Pathways And Spaces' (Revision D, 2015).
  - c. TIA-606, 'Administration Standard for Telecommunications Infrastructure' (Revision B, 2012).
  - TIA-607, 'Telecommunications Bonding and Grounding (Earthling) for Customer Premises' (Revision C, 2015)
  - e. TIA-758, 'Customer-Owned Outside Plant Telecommunication Infrastructure Standard' (Revision B, 2012).
  - f. TIA-942, 'Telecommunications Infrastructure Standard for Data Centers' (Revision A, 2014).
  - g. TIA-1152, 'Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling' (2009 Edition).

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide Manufacturer's documentation and descriptive information on each piece of equipment to be used.

#### PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Atlas Sound, Phoenix, AZ www.atlassound.com.
    - b. Lowell Manufacturing Co., Pacific, MO www.lowellmfg.com
    - c. Middle Atlantic Products, Fairfield, NJ www.middleatlantic.com.

#### PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Approved Installers:
  - 1. Approved installers in Section 27 5117 are to both furnish and install components of this section. See Section 01 4301. Installer requirements of Section 01 4301 applies.

#### 3.2 INSTALLATION

- A. Equipment Cabinet:
  - 1. See Section 27 5117 'Sound System' for installation of Sound Equipment.
- B. Equipment Cabinet:
  - Install vent panels at top and bottom of equipment cabinets and between components where possible for maximum ventilation when equipment locations is not specified in Contract Drawings. Locate amplifiers at top of cabinet. Locate equalizers below amplifiers, separated by several vent panels.
  - 2. Securely fasten equipment plumb and square in place. Utilize all fastening holes in front of cabinet.
  - 3. Securely fasten in place equipment that is not rack mounted, including relays and other small components. Do not use sticky-back tape.
  - 4. Install balancing / isolation transformer when balanced and unbalanced components are connected.
  - 5. Wire XLR-type connections with pin 2 hot, pin 1 shield.
  - 6. Connect powered components to 120 VAC outlets on voltage suppressor power bars. Do not connect to outlets on other components.
  - 7. Identification:
    - a. Legibly identify user-operated system controls and system input / output jacks using engraved, permanently attached laminated plastic plates or imprinted Lexan labels. Label equipment and controls within equipment cabinets using similar labels or printed labels from a label maker or laser printer.
    - b. Affix label to rack panel inside cabinet listing name and telephone number of installer. Appropriate warranty instructions may be included.
- C. Communications Racks, Frames and Enclosures:
  - 1. Racks shall be installed as per Manufacturer's recommendations.
  - Racks shall be securely attached to concrete floor with 3/8 inch minimum hardware or as required by local codes.
  - 3. Place racks with 36 inches minimum clearance front and back from walls and 28 inches clear on one side of rack. When mounted in row, maintain 36 inches minimum from wall behind and in front of row of racks and from wall at each end of row.
  - 4. Grounding:

- a. Racks shall be grounded to telecommunications ground bus bar as per Section 26 0526 'Grounding And Bonding For Electrical Systems'.
- b. Racks shall be grounded in accordance with TIA-607.
- 5. Seismic Bracing:
  - a. Comply with IBC and local seismic requirements for all equipment and conduit pathways.
- 6. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with rack upon completion of installation.
- Mounted termination block fields shall be mounted on Terminal Board in Technology Room provided by Electrical
  as shown in Contract Documents.
  - a. Wall mounted termination block fields shall be installed with lowest edge of Terminal Board.

## 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to Owner.

END OF SECTION

# SECTION 27 1501 COMMUNICATIONS HORIZONTAL CABLING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish, install, and test communications horizontal cabling as described in Contract Documents including following:
    - a. Cables and related terminations.
    - b. Patch cords and modular connectors.
    - c. Surface raceway and outlet poles.
    - d. Support and grounding hardware.
    - e. UTP Cable.
    - f. UTP Patch cords.
    - g. UTP Connector Modules.
    - h. Installation and testing of Owner Furnished Network Equipment.
- B. Related Requirements:
  - 1. Division 26: Raceways and surface boxes.
  - 2. Section 07 8400: 'Firestopping' for furnishing and installation of firestopping.
  - 3. Section 26 0526: 'Grounding And Bonding For Electrical Systems' for installation and termination.
  - 4. Section 27 1116: 'Communications Cabinet, Racks, Frames, and Enclosures'.
  - 5. Section 27 4117: 'Video And Satellite Distribution Systems'.
  - 6. Section 27 5117: 'Audio Systems'.
- C. Products Installed But Not Furnished Under This Section:
  - Owner Furnished Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
    - a. Internet Firewall.
    - b. ISP Modem.
    - c. Network Switch.
    - d. Wireless Access Port.
- D. Related Requirements:
  - 1. Section 01 6400: Owner will provide Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents. Contract Documents establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives. Design Criteria in PART 2 of this Section identifies Contractor's responsibility for Owner Network Equipment.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. British Standards Institution (BSI):
    - a. BS EN 50310:2006, 'Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment'.
  - 2. Building Industry Consulting Service International (BISCI:
    - a. *Information Transport Systems Installation Methods Manual* (ITSIMM) (5<sup>th</sup> Edition).
    - b. *Telecommunications Distribution Methods* Manual (TDMM) (12<sup>th</sup> Edition).
  - B. Institute of Electrical and Electronics Engineers:
    - a. IEEE 802.3-2012, 'Standard for Ethernet'.
    - b. IEEE 1100-2005, 'Recommended Practice for Powering and Grounding Electric Equipment'.
  - 4. Telecommunications Industry Association:
    - a. TSB-162. 'Telecommunication Cabling Guidelines for Wireless Access Points' (March 2006).
- B. Reference Standards:
  - 1. International Electrotechnical Commission:

- a. IEC 60603-7:2011, 'Connectors for electronic equipment Part 7 'Detail specification for 8-way, unshielded, free and fixed connectors'.
- 2. International Organization for Standardization / International Electrotechnical Commission:
  - a. ISO/IEC 11801:2002/Amd 2:2010, 'Information Technology-Generic Cabling for Customer Premises'.
- 3. National Fire Protection Association:
  - a. NFPA 70–2014, 'National Electrical Code'.
- 4. Telecommunications Industry Association:
  - a. TIA-568-C.2, 'Balanced Twisted-Pair Telecommunications Cabling and Components Standards' (Revision C, 2009).
  - b. TIA-569, 'Telecommunications Pathways And Spaces' (Revision D, 2015).
  - c. TIA-606, 'Administration Standard for Telecommunications Infrastructure' (Revision B, 2012).
  - d. TIA-607, 'Telecommunications Bonding and Grounding (Earthling) for Customer Premises' (Revision C, 2015).
  - e. TIA-758, 'Customer-Owned Outside Plant Telecommunication Infrastructure Standard' (Revision B, 2012).
  - f. TIA-942, 'Telecommunications Infrastructure Standard for Data Centers' (Revision A, 2014).
  - g. TIA-1152, 'Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling' (2009 Edition).
- 5. Underwriters Laboratories:
  - a. UL 94: The Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances Testing (March 2013 6th Edition).
    - 1) 94HB, 'Horizontal Burn Test'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

 Coordinate with Project Manager and/or Facility Manager well in advance of Substantial Completion for installation of all Owner Furnished Network Equipment.

#### 1.4 SUBMITTALS

## A. Action Submittals:

- 1. Product Data:
  - a. Provide Manufacturer's documentation, installation instructions, and descriptive information on each piece of equipment to be used.
- 2. Shop Drawings:
  - a. Provide three (3) copies of labeling system reflecting approved label scheme for cable installation for racks, cables, panels, and outlets.

## B. Informational Submittals:

- Certificates:
  - a. Provide Installer certificates of qualifications required.
- 2. Design Data:
  - a. Identification and labeling:
    - 1) Provide labeling system for cable installation to be approved by Owner.
      - a) Clearly identify all components of system: racks, cables, panels and outlets.
      - b) Designate cables origin and destination and unique identifier for cable within facility by room number and port count.
      - c) Racks and patch panels shall be labeled to identify location within cable system infrastructure.
  - After system installation, provide three (3) full documentation sets to Consulting Engineer/Architect for approval.
- 3. Tests And Evaluation Reports:
  - Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
  - b. Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
  - c. At request of Consulting Engineer, provide copies of original test results.
- 4. Field Quality Control Submittals:
  - a. Architect will provide floor plans in paper and electronic formats on which record documentation information can be recorded.
- 5. Qualification Statements:
  - a. Letter from Manufacturer certifying level of training and experience of Installer.

- C. Closeout Submittals:
  - 1. Include following information in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - Manufacturer's literature or cut sheet.
      - 2) Tests and evaluation reports.
      - 3) As-built Documentation:
        - a) Provide record document to include cable routes and outlet locations.
          - (1) Sequential number shall identify outlet locations.
          - (2) Numbering, icons, and drawing conventions used shall be consistent throughout all documentation.
          - (3) Provide labeling system information.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and State and/or local ordinances and regulations shall govern unless more stringent requirements are specified.
  - 2. Meet all TIA/EIA commercial building wiring standards.
  - 3. Meet Telecommunications Distribution Methods Manual (TDMM) (12<sup>th</sup> Edition) requirements for installation and testing.
  - 4. All Networks shall be installed per applicable standards and manufacturer's guidelines.
  - 5. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
  - 6. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
  - 1. Manufacturer Qualifications:
    - a. Provide single source for all products of system:
      - 1) KeyConnect by Belden.
      - 2) Netkey by Panduit.
      - 3) System 6 by Siemon.
      - 4) Uniprise Media 6 by CommScope.
  - 2. Installers Qualifications:
    - a. Approved and Certified by Manufacturer (installation and maintenance trained):
      - 1) Belden Certified System Vendor (CSV).
        - a) Belden Certified LDS Partner.
      - 2) CommScope Certified Business Partner.
        - a) CommScope Certified LDS Partner.
      - 3) Panduit Certified Installer (PCI).
      - 4) Siemon Certified Installers (CI).
    - b. Three (3) year experience with similar projects. Provide documentation.

#### 1.6 WARRANTY

- A. Special Warranty:
  - Cabling System:
    - a. Provide warranty for permanent link cabling system to meet Category 6 standard requirements for structured cabling system for twenty (20) years.
  - Installer Warranty:
    - a. Installer guarantees that all work is in accordance with all express and implied requirements of Contract Documents, that all work is of good quality, and further warrants work and material for period of (1) year from date of substantial completion of project, unless longer period of time is specified in Contract. All work not conforming to these requirements, may be considered defective:

- If, within one (1) year after substantial completion of work, or within such longer period of time as may
  be prescribed by law or by terms of any warranty in Contract, any of work is found to be defective or
  not in accordance with Contract, Installer shall at Installer cost correct it promptly after receipt of
  written notice from Owner.
- 2) Installer's obligation shall survive termination of Contract.
- 3) Owner shall give such notice within reasonable time after discovery of condition.
- b. Installer warrants to Owner that all materials and equipment furnished under this Contract shall be new unless otherwise specified, free from faults and defects and in conformance with Contract Documents:
  - Contractor shall secure manufacturer's warranties and deliver copies thereof to Owner upon completion of work.
  - 2) All such warranties shall commence from date of substantial completion, and will not in any way reduce Installer's responsibilities under his Contract.
  - 3) Whenever guarantees or warranties are required by specifications for longer period than one year, such longer period shall govern.
- c. Installer will provide twenty (20) year minimum end to end manufacturer warranty.

#### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Four Products. See Section 01 6200 for definitions of Categories:
  - 1. LDS Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
    - a. Internet Firewall.
    - b. ISP Modem.
    - c. Network Switch.
    - d. Wireless Access Port.
  - Coordination:
    - a. Coordinate installation of all Owner Furnished Network Equipment including but limited to:
      - 1) Installation and configure devices in accordance with LDS requirements.
      - 2) Proper set-up of network equipment.
      - 3) Owner Furnished internet service to building prior to final installation of AV and Voice Data Equipment.
      - 4) Testing of network equipment.

#### 2.2 SYSTEMS

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories:
    - a. Belden, St. Louis, MO www.belden.com.
    - b. Panduit Corporation, Tinley Park IL www.panduit.com.
    - c. Systimax Solutions, a CommScope Company, Hickory, NC www.systimax.com.
    - d. The Siemon Company, Watertown, CT www.siemon.com.
- B. Design Criteria:
  - 1. Must install single manufacture as complete permanent link.
    - a. Category 6 minimum compliance margin on all parameters beyond category 6 and Power Sum ACR out to 250 MHz.
  - 2. Entire Category 6 system to be provided by single approved Manufacturer throughout.
  - Install structured cabling system that will be able to support interconnections to active telecommunications
    equipment for voice and data applications in multi vendor, multi product environment. Structured cabling
    system should adhere to TIA-568, TIA-606; TIA-607, and TIA-942 standards with respect to pathways,
    distribution, administration, and grounding of the system.
  - 4. Each room drop will consist of two drops each consisting of two terminations can be interoperable to accommodate either voice or data applications. Provide convenience phone drops that will consist of single termination that will be installed in proper faceplate for each location's phone.
  - 5. Install, terminate, test, and guarantee each drop according to customer all applicable standards and customer preferences.
  - 6. Horizontal cables will be rated Category 6 (250 MHz) in performance and rated to comply with TIA-568 to connector outlets at Work Area. Horizontal cables will home run back to Technology Room (Entrance Facility / Main Cross Connect) and will terminate on individual Category 6 rated jacks to populate modular 48 port angled

- patch panel on open or flat patch panel inside enclosures. All cables will be patched at cutover as interconnection into floor serving active equipment using RJ45 modular equipment cables rated to Category 6.
- 7. Match additions to horizontal raceway to complete system according to TIA-568 where suspension and protection gaps exist.

## C. Components – Work Area Subsystem:

- 1. Provide connectivity equipment used to connect horizontal cabling subsystem and equipment in work area. Both copper and fiber media shall be supported. Connectivity equipment shall include following options:
  - a. Patch (equipment) cords and modular connectors.
  - b. Outlets and surface mount boxes.
  - c. Surface raceway and outlet poles.
  - d. Consolidation point / MUIO.
- Patch Cords and Modular Connectors:
  - a. Match horizontal cabling medium and rating. Same Manufacturer shall provide modular connectors and patch cords. Total patch cord length at work area is not to exceed 10 feet.
  - b. Copper Connectivity:
    - 1) Network Cabling System:
      - a) Provide for Work Area subsystem, including all modular connectors.
      - Modular connectors shall support of high-speed networks and applications designed for implementation on copper cabling.
      - Outlets shall utilize fully interchangeable and individual connector modules that mount side-byside to facilitate quick and easy moves, adds and changes.
    - 2) Modular Connections:
      - a) Data Modules shall be Category 6:
        - Eight position modules required in all work areas and shall exceed connector requirements of TIA Category 6 standard.
        - (2) Prove termination cap with strain relief on cable jacket, ensure cable twists are maintained to within 1/8 inch and include wiring scheme label. Wiring scheme label shall be available with TIA-568 wiring schemes.
      - b) Terminations shall use for TIA-568 wiring scheme.
      - c) Modules shall terminate 4 pair 23 100-ohm solid unshielded twisted pair cable.
      - Modules shall meet ISO 11801 standard including complying with intermateability standard IEC 60603-7 for backward compatibility.
      - e) Category 6 modules shall have UL and CSA approval.
      - f) Modules shall have ETL verified Category 6 performance and ISO 11801 Class E performance in both basic and channel links.
      - g) Modules shall be universal in design, accepting 2, 3, or 4 pair modular plugs without damage to outer jack contacts.
      - h) Modules shall be able to be re-terminated minimum of 10 times and be available in 11 standard colors for color-coding purposes.
      - i) Jack shall snap into all outlets and patch panels.
      - j) Module shall include black base to signify Category 6 400 MHz performance.
    - 3) Patch Cords:
      - a) Category 6 patch cords 'shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and strain-relief boots to support easy moves, adds, and changes.
      - b) Constructed with Category 6 23-AWG stranded UTP cable.
      - c) Each patch cord shall be one hundred (100) percent performance tested at factory in channel test to TIA Category 6 standard.
      - d) Patch cords shall come in standard lengths of 3, 5, 7, 9, 14 and 20 feet and 6 standard colors of Blue or White.
      - e) Provide one (1) each 8 feet patch cord for 50 percent of terminated work station ports.
- 3. Outlets and Surface Mount Boxes:
  - a. Outlets and surface mount boxes shall support network system by providing high-density in-wall, surface mount cabling applications.
  - b. Provide faceplates for flush mount:
    - 1) Outlets faceplates shall be manufactured from high-impact thermoplastic material with UL 94 flammability rating of 94 HB or better.
- 4. Copper Cable:
  - a. Design Criteria:
    - 1) Performance exceeds all TIA-568 Category 6 and ISO 11801 for Class E cable requirements.
    - 2) ETL tested and verified for Category 6 component performance.
    - 3) Conductors are twisted in pairs with four pairs contained in flame retardant PVC jacket separated by a spline.
    - 4) Performance tested to 650 MHz.

- 5) Plenum (CMP) and non-plenum/riser (CMR) flame rated.
- 6) Maximum installation tension of 25 lbs (110 N).
- 7) Installation temperature range: 32 deg F to 140 deg F.
- 8) Operating temperature range: 14 deg F to 140 deg F.
- 9) Cable diameter: Riser 0.26 inch 0.260"; Plenum 0.25 inch.
- 10) Easy payout, reel-in-a-box and descending length markings on cable speed installation.
- Supports following applications: Ethernet 10BASE-T, 100BASE-T (Fast Ethernet) and 1000BASE-T (Gigabit Ethernet); 1.2Gb/s ATM; Token Ring 4/16; digital video; and broadband/baseband analog video.
- 12) Color shall be blue.

## D. Horizontal Distribution Cabling:

#### . General:

- Horizontal distribution cabling system is portion of telecommunications cabling system that extends from work area telecommunications outlet/connector to horizontal cross-connect in Technology Room (Entrance Facility / Main Cross Connect).
  - Horizontal cabling in office should terminate in Technology Room (Entrance Facility / Main Cross Connect) located on same floor as Work Area being served.
  - 2) Horizontal cabling is installed in star topology (home run).
  - 3) Bridged taps and splices are not permitted as part of copper horizontal cabling.

## E. Components – Technology Room (Entrance Facility / Main Cross Connect):

- 1. General:
  - a. Connect networking equipment to horizontal and backbone cabling subsystems:
    - 1) Termination hardware (connectors and patch cords), racks, cable management products and cable routing products.
    - 2) Cable termination hardware.
  - b. Terminate each horizontal or backbone cabling run using appropriate connectors or connecting blocks depending upon cable type:
    - 1) Matching patch cords will be used to perform cross-connect activities or to connect into the networking/voice hardware:
      - a) Category 6 Enhanced Unshielded Twisted Pair (UTP).
  - c. Four-pair Category 6 UTP cabling shall be terminated onto four-pair Category 6 module:
    - 1) All modules shall be terminated using 568-B wiring scheme.
    - 2) Eight position module shall exceed connector requirements of TIA Category 6.standard.
    - Jack termination to 4-pair, 100 ohm solid unshielded twisted pair cable shall be by use of forward motion termination cap and shall not require use of punchdown or insertion tool.
- 2. Rack, Cabinet, and Cabling Management Enclosure:
  - a. Cable Management:
    - 1) Cable Management System shall be used to provide neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures.
    - 2) Provide complete cable management system comprised of vertical and horizontal cable managers to manage cables on both front and rear of rack.
    - 3) System shall protect network investment by maintaining system performance, controlling cable bend radius and providing cable strain relief.
  - b. Vertical Cable Management:
    - 1) General:
      - a) Vertical cable managers include components that aid in routing, managing and organizing cable to and from equipment.
      - Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
    - 2) Provide panels with universal design mounting to 19 inches rack and constructed of steel bases with PVC duct attached.
    - Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
  - c. Horizontal Cable Management:
    - 1) General:
      - a) Horizontal cable managers include components that aid in routing managing and organizing cable to and from equipment.
      - Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
    - Provide panels with universal design mounting to 19 inches rack and constructed of steel bases with PVC duct attached.
    - 3) Duct fingers shall include retaining tabs to retain cables in place during cover removal.

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4) Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.

## 3. Patch Cords:

- a. Provide patch cords between modular patch panels configured as cross-connect or between patch panel and networking hardware when patch is used as interconnect. Provide one (1) each 3 feet patch cord for each terminated patch panel port.
- Provide patch cords as indicated on Drawings and Specifications as shown in Contract Documents. Ensure all devices are fully connected to network equipment.
- Provide additional patch cords with appropriate length to connect all Owner provided internet enabled appliances (IEA) as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents.
- d. Patch cords shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and black strain-relief boots to support easy moves, adds and changes.
- e. Construct patch cords with Category 6 24-AWG stranded UTP cable.
- f. Patch cords shall be one hundred (100) percent performance tested at factory in channel test to Category 6 standard.

#### 4. Patch Panels:

- a. Four-pair Category 6 UTP cabling shall be terminated onto four-pair-punch-down style connecting hardware mounted to rear of integral patch panels and routed to Category 6 modules on front face of patch panel.
- b. Patch panels shall be universal for TIA-568 wiring configurations.
- c. Patch panels shall have removable 6-port design that allows 6-port module to be removed without disrupting other ports.
- d. Integral cable tie mounts shall be included in panel for cable management on back of panel.
- e. Port and panels shall be easy to identify with write-on areas and optional label holder for color-coded labels.
- f. Rack mountable patch panels shall mount to standard 19 inches rack.

## 5. Grounding and Bonding:

- a. Provide Telecommunications Bonding Backbone:
  - Ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has potential to act as current carrying conductor.
  - 2) Install telecommunication Bonding Backbone independent of building's electrical and building ground.
  - 3) Designed in accordance with recommendations contained in TIA-607 Telecommunications Bonding and Grounding Standard.
- b. All wires used for telecommunications grounding purposes shall be identified with green insulation:
  - 1) Non-insulated wires shall be identified at each termination point with wrap of green tape.
  - 2) All cables and bus bars shall be identified and labeled as required.
- 6. Firestopping: Furnish and install firestopping as per Section 07 8400.

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

## A. General:

1. Install communications system in accordance with Manufacturer's written instructions, and complying with applicable portions of NEC 'Standard of Installation'.

## B. Work Area Outlets:

- 1. Cables shall be coiled in in-wall or surface-mount boxes if adequate space is present to house cable coil without exceeding Manufacturers bend radius.
  - a. No more than 12 inches of UTP slack shall be stored in in-wall box, modular furniture raceway, or insulated walls.
  - b. Excess slack shall be loosely configured and stored in ceiling above each drop location when there is not enough space present in outlet box to store slack cable.
- 2. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
- 3. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
- 4. Pair untwist at termination shall not exceed 0.125 inch.
- 5. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
- 6. Cable jacket shall be maintained to within one inch of termination point.
- 7. Data / voice jacks, unless otherwise noted in Contract Documents, shall be located on each faceplate.

- 8. Horizontal Cabling:
  - a. Data jacks in horizontally oriented faceplates shall occupy rightmost position(s).
  - b. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

#### C. Horizontal Cross Connect:

- 1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
- 2. Pair untwist at termination shall not exceed 0.125 inch.
  - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
- 3. Cables shall be neatly bundled and dressed to their respective panels or blocks.
  - a. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
  - b. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
- 4. Cable jacket shall be maintained as close as possible to termination point.
- 5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle support ties.
  - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.
- 6. Horizontal Cabling:
  - a. A pull cord (nylon; 1/8 inch minimum) shall be co-installed with all cable installed in any conduit.
  - b. Cable raceways shall not be filled greater than required by TIA-569 maximum fill for particular raceway type.
  - c. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
  - d. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in enclosure intended and suitable for purpose.
  - e. Cable's minimum bend radius and maximum pulling tension shall not be exceeded.
  - f. If J-hook or trapeze system is used to support cable bundles, all horizontal cables shall be supported at 48 inch to 60 inches maximum intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
  - g. Horizontal distribution cables shall be bundled in groups of no more than 25 cables. Cable bundle quantities in excess of 25 cables may cause deformation of bottom cables within bundle and degrade cable performance.
  - Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
  - i. Cable shall be installed above fire-sprinkler systems and shall not be attached to system or any ancillary equipment or hardware. Cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
  - j. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, install appropriate carriers to support cabling.
  - k. Cables shall be identified by self-adhesive label and meet requirements of TIA-606. Cable label shall be applied to cable behind faceplate on section of cable that can be accessed by removing cover plate.
  - I. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in run and at termination field.
  - m. Pulling tension on 4-pair UTP cables shall not exceed 25 lbf for a four-pair UTP cable.

## D. Vertical Outlet Pole And Surface Raceway:

- 1. Horizontal Cabling:
  - a. General:
    - Vertical outlet poles and Surface Raceway refers to surface raceway system used for branch circuit
      wiring and/or data network, voice, video and other low-voltage cabling. Surface raceway shall be used
      in solid wall applications or for applications where moves, additions and changes are very typical to
      workflow.
  - b. Raceway system shall consist of raceway, appropriate fittings and accessories to complete installation per electrical Contract Documents. Non-metallic surface raceway is to be utilized in dry interior locations only as covered in Article 352, part B of the NEC, as adopted by the NFPA and as approved by the ANSI.

## E. Copper Termination Hardware:

- 1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
- 2. Pair untwist at termination shall not exceed 0.125 inch.
  - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
- 3. Cables shall be neatly bundled and dressed to their respective panels or blocks.

- Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
- b. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
- 4. Cable jacket shall be maintained as close as possible to termination point.
- 5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle Velcro support straps.
  - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.

#### F. Grounding System:

- Where required, Telecommunications Bonding Backbone shall be designed and/or approved by qualified Installer.
- Follow requirements of TIA-607.

## G. Seismic Bracing:

1. Comply with IBC and local seismic requirements for all equipment and conduit pathways.

## H. Identification and Labeling:

- 1. Apply machine generated approved labeling for racks, cables, panels and outlets:
  - a. Designate cables origin and destination and unique identifier for cable by room name and/or number and port count.
  - b. Racks and patch panels shall be labeled to identify location within cable system infrastructure.
- 2. Place labeling within view at termination point on each end.
- 3. Outlet, patch panel and wiring block labels shall be installed on, or in, space provided on device.
- 4. See Contract Drawings for labeling scheme.
- Conform to IP addressing assignments as listed in Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNEMENT TABLE'.
  - a. See Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNEMENT TABLE' for 'IP Address Assignments.

#### 3.2 FIELD QUALITY CONTROL

## A. Field Tests:

- 1. Provide testing upon completion of installation.
  - a. General:
    - 1) Testing to be in accordance with TIA standards and Manufacturer's system warranty guidelines and best industry practice.
      - a) If any of these are in conflict, discrepancies shall be brought to attention of Architect/Consulting Engineer for clarification and resolution.
  - b. Cables and termination hardware:
    - 1) Test complete system for defects in installation.
    - 2) Verify cabling system performance under installed conditions according to requirements of TIA-568:
      - a) All pairs of each installed cable shall be verified prior to system acceptance.
      - b) Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure one hundred (100) percent useable conductors in all cables installed.
  - c. Copper channel testing:
    - All twisted-pair copper cable links shall be tested for compliance to requirements of TIA-568 for appropriate Category of cabling installed.
    - 2) Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm.
  - d. UTP Cables and Links testing:
    - 1) UTP cabling channel must be tested at swept frequencies up to 250 MHz for internal channel performance parameters as defined in IEEE 802.3 and TIA-568. Certifications shall include following parameters for each pair of each cable installed:
      - a) Wire map (pin to pin connectivity).
      - b) Length (in feet or millimeters).
      - c) Near End Crosstalk (NEXT).
      - d) Far End Crosstalk (FEXT).
      - e) ELFEXT.
      - f) Attenuation/Crosstalk Ration (ACR).
      - g) Return Loss.
      - h) Propagation Delay.

- i) Delay Skew.
- j) Test equipment shall provide electronic and printed record of these tests.
- 2) Test each pair of cable for opens, shorts, grounds, and pair reversal.
  - a) Correct short or grounded and reversed pairs.
  - b) Examine open and shorted pairs to determine if problem is caused by improper termination.
  - c) If termination is proper, tag bad pairs at both ends and note on termination sheets.
  - d) If horizontal cable contains bad conductors, remove and replace cable.
- e. Testing Equipment:
  - 1) Comply with requirements of TIA-568.
    - a) Appropriate level III tester shall be used to verify Category 6 cabling systems.
  - 2) UTP Cables and Links test equipment:
    - a) Category Four Approved Testing Equipment. See Section 01 6200 for definitions of Categories:
      - (1) Fluke Networks DTX-1800 with firmware version 2.04 or later.
        - (a) Test lead to be P/N DTX-PLA001 or PLA002 universal permanent link interface adapter.
      - (2) Agilent Wirescope Pro N2640A with firmware version 2.1.9 or later.
        - (a) Test lead to be P/N N2644A-101 universal CAT6A link smart probes.
- f. Re-Testing:
  - 1) Consulting Engineer may request ten (10) percent random field re-test to be conducted on cable system, at no additional cost to Owner, to verify documented findings.
    - a) Tests shall be repeat of those defined above.
    - b) If findings contradict documentation submitted, additional testing can be requested to extent determined necessary by Consulting Engineer, including one hundred (100) percent re-test at no additional cost to Owner.
- g. Tests And Evaluation Reports:
  - 1) Printouts generated for each cable by wire test instrument shall be submitted as part of documentation package. Installer may furnish this information in electronic form.
    - a) Media shall contain electronic equivalent of test results as defined by the Section along with software necessary to view and evaluate test reports.
  - 2) Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
  - 3) Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
  - 4) If requested by Consulting Engineer, provide copies of original test results.
- h. Test Documentation:
  - 1) Provide electronic format documentation within three (3) weeks after completion of project.
  - 2) Documentation shall be clearly marked on outside front cover with following:
    - a) "Project Test Documentation".
    - b) Project name.
    - c) Date of completion (month and year).
  - 3) Test results shall include following:
    - a) Record of test frequencies.
    - b) Cable type.
    - c) Conductor pair and cable (or outlet) I.D.
    - d) Measurement direction.
    - e) Reference setup.
    - f) Crew member name(s).
    - g) Test equipment name, manufacturer, model number, serial number, software version.
    - Last calibration date:
      - (1) Unless Manufacturer specifies more frequent calibration cycle, annual calibration cycle is required on all test equipment used on project.
      - (2) Document shall detail test method used and specific settings of equipment during test as well as software version being used in field test equipment.
- B. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to following:
  - 1. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced at no additional cost to Owner.
  - 2. Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure one hundred (100) percent useable conductors in all cables installed at no additional cost to Owner.
  - 3. Correct deviation and repeat applicable testing at no additional cost to Owner.

- 4. Correct any work found defective or not complying with Association Publications and TDMM requirements at no additional cost to Owner.
  - a. Document all problems found and corrective action taken.
  - b. Include both failed and passed test data.

END OF SECTION

**ATTACHMENTS** 

# **FACILITIES ZONE IP ADDRESS ASSIGNMENTS**

Installers connecting any equipment to the Facilities Zone shall conform to the IP addressing assignments listed in the Table below.

- For each device listed, the Device must be statically assigned the IP Address that is given by adding the specified offset in the table to the Facility Zone Gateway address.
- IP addresses should follow standard IPv4 Octet form.
- The respective Device installer is responsible for setup of the device.
- Structured Cabling Installer shall post a copy of this list near the Firewall, with the Gateway address filled in.

FACILITIES ZONE IP ADDRESS ASSIGNEMENT TABLE				
Facility Zone Gateway Address	10			
Device Name	Gateway Offset			
Fire Alarm	1			
Security System	2			
Condenser Theft Detection System	3			
Access Control	4			
Lighting Controller	5			
Webstat Thermostat	6			
Irrigation	7			
Solar Panel Charge Controller	8			
DSP1	9			
DSP2	10			
Surge Suppressor 1	11			
Surge Suppressor 2	12			
Contrio 1 - Chapel (MA)	13			
Contrio 2 - Rack (KP)	14			
Contrio 3 - Relief Society (SV8)	15			
Contrio 4 - Children's Room (SV8)	16			
Contrio 5 - Priesthood/ Multi-Purpose (SV8)	17			
Power Amp (1)	18			
Satellite Receiver #1	19			
Satellite Receiver #2	20			
Open	21			
Open	22			
Open	23			
Open	24			

# SECTION 27 4117 VIDEO SYSTEMS

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete and operational video and satellite system as described in Contract Documents including:
    - a. Satellite dish, LNB, receiver, line amplifiers, video and audio processors, video switchers, cable, connectors and ancillary equipment necessary to successful reception and distribution of video and audio signal from selected reception device (satellite and/or video stream).
    - b. Installation and testing of Owner Furnished Network Streaming Equipment.
  - 2. Assist Audiovisual Consultant with final inspection of system and provide necessary test equipment. Correct problems found at time of final inspection of system.
- B. Related Requirements:
  - 1. Division 26: 'Electrical':
    - a. Power to equipment location.
  - 2. Section 26 0533: 'Raceway And Boxes For Electrical Systems' for raceway and boxes for video wiring.
  - 3. Section 27 1116: 'Communications Cabinet, Racks, Frames, and Enclosures'.
  - 4. Section 27 5117: 'Audio Systems'.
  - 5. Instructions to Owner by Audiovisual Consultant.
  - 6. Audiovisual Consultant will perform final inspection and instruct local leaders in operation of system.
- C. Products Furnished But Not Installed Under This Section:
  - 1. Steel base pipe for satellite system.
- D. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of concrete base pier for base pipe.
  - 2. Section 09 9113: 'Exterior Painted Galvanized Metal' for finish painting of base pipe.
- E. Products Installed But Not Furnished Under This Section:
  - 1. Owner Furnished Network Streaming Equipment as specified on TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
    - a. Webcast Communicator or Webcast Capable Device.
- F. Related Requirements:
  - Section 01 6400: Owner will Furnish Network Streaming Equipment as specified on TA (Technology Audiovisual)
     Drawings as shown in Contract Documents. Contract Documents establishes quality of materials and installation
     for information of Contractor, Architect, and Owner's Representatives. Design Criteria in PART 2 of this Section
     identifies Contractor's responsibility for Owner Network Equipment.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. Building Industry Consulting Service International (BISCI:
    - a. Information Transport Systems Installation Methods Manual (ITSIMM) (5th Edition).
    - b. *Telecommunications Distribution Methods Manual* (TDMM) (12<sup>th</sup> Edition).
  - 2. InfoComm International Association:
    - a. Audiovisual Best Practices: The Design & Integration Process for the AV and Construction Industries.
    - b. AV Design Reference Manual (1st Edition, 2006).
    - c. Basics of Audio and Visual Systems Design (2003).
  - 3. Institute of Electrical and Electronics Engineers:
    - a. IEEE 1100-2005, 'Recommended Practice for Powering and Grounding Electric Equipment'.

#### B. Reference Standards:

- 1. American National Standards Institute/InfoComm International Association:
  - a. ANSI/INFOCOMM 2M:2010, 'Standard Guide for Audiovisual Systems Design and Coordination Processes'.
  - b. ANSI/INFOCOMM 3M:2011, 'Projected Image System Contrast Ration'.
  - :. ANSI/INFOCOMM 4:2012, 'Audiovisual Systems Energy Management'.
- ASTM International:
  - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
- 3. National Fire Protection Association:
  - NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ
    including all applicable amendments and supplements).
  - o. NFPA 72: 'National Fire Alarm and Signaling Code' (2016 Edition).
- 4. Telecommunications Industry Association:
  - a. TIA-568-C.2, 'Balanced Twisted-Pair Telecommunications Cabling and Components Standards' (Revision C. 2009).
  - b. TIA-569, 'Telecommunications Pathways And Spaces' (Revision D, 2015).
  - c. TIA-606, 'Administration Standard for Telecommunications Infrastructure' (Revision B, 2012).
  - d. TIA-607, 'Telecommunications Bonding and Grounding (Earthling) for Customer Premises' (Revision C, 2015).
  - e. TIA-758, 'Customer-Owned Outside Plant Telecommunication Infrastructure Standard' (Revision B, 2012).

## 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- 1. Coordinate with Owner's Representative (Project Manager and/or Facility Manager) well in advance of Substantial Completion for installation of all Owner Furnished Network Streaming Equipment.
- 2. Coordinate final inspection schedule of both audio and video systems before Audiovisual Consultant's final inspection.

## B. Schedule:

- 1. After completion of video system installation of this section, Installer to perform Field Testing before Audiovisual Consultant Final Inspection of audio system.
- 2. Notify Audiovisual Consultant two (2) weeks minimum before Field Inspection specified in Field Quality Control in Part 3 of this specification.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Manufacturer Reports:
    - a. Itemized list of equipment to be supplied.
  - 2. Special Procedure Submittals:
    - a. Provide itemized list of equipment to be supplied.
    - b. Provide proposed labeling for system components.
  - 3. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation as requested by Engineer/Architect including:
        - a) List of Projects requested.
        - b) List of certified technician(s) with dates of training courses completed.

## B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Include following items supplied by Audiovisual Consultant at time of final inspection:
      - a) System operation and maintenance instructions.
      - List of equipment provided, including portable equipment, showing make, model, and serial number.
    - Leave clear plastic sheet protector in rear of equipment cabinet with system drawings and documentation.
    - 3) Set-up files and settings for video equipment.

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- b. Warranty Documentation:
  - Final, executed copy of Warranty.
- c. Record Documentation:
  - Manufacturers documentation:
    - Equipment manufacturer's manuals and warranty information.
- d. Software:
  - 1) Video System Software:
    - Set-up files and settings for video equipment.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall be installed in accordance with applicable standards, requirements, and recommendations of International Building Code, National Electrical Code and all local authorities having jurisdiction.

## B. Qualifications:

- 1. Installer. Requirements of Section 01 4301 applies, but not limited to following:
  - a. Approved Installers:
    - 1) Installers are to furnish and install components of video system and meet qualification requirements.
    - 2) Approval subject to agreement process for Pre-Approval Installers.
  - b. Alternate Installer(s):
    - 1) Firm specializing in performing work of this section:
      - a) Minimum three (3) years of successful installation experience of AV system projects of comparable size, and complexity required for this project. Audio systems must have included complete installation and setup work and must have been completed by factory trained and certified technician.
      - b) Firm successfully completed minimum of three (3) projects in past two (2) years before bidding.
      - c) Firms must have certified technician that has successfully completed all relevant training courses recommended by manufacturers and proficient of all specified equipment of this section.
      - d) Comply with specifications and Contract Documents.
    - Submit documentation of compliance of qualifications before bid to Architect or Owner's Representative.
  - c. Same Approved Installer shall furnish and install Section 27 5117 'Audio Systems'.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Provide secure location protected from weather in cool, dry location, out of direct sunlight in compliance with Manufacturer's instructions and recommendations.
  - 2. Keep materials free from dirt and foreign matter.

## 1.7 WARRANTY

- A. Special Warranty:
  - 1. Provide complete warranty repair or replacement for one (1) year at no cost to Owner, except in case of obvious abuse.
  - If failure causes Chapel or Cultural Center audio system to be inoperative or unusable for its intended purpose, Installer, when notified of problem before Wednesday, shall repair system so it will be operational and usable by following Sunday. If defective components cannot be repaired in time, furnish and install temporary loaner equipment as required.
  - 3. Honor component warranties for term established by Manufacturer, if greater than one (1) year.

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#### PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Four Products. See Section 01 6200 for definitions of Categories:
  - Network Streaming Equipment as specified on TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
    - Projectors.
    - b. Video Monitors.
  - 2. Coordination:
    - a. Coordinate installation of all Owner Furnished Network Streaming Equipment including but not limited to:
      - 1) Installation and configure devices in accordance with LDS requirements.
      - 2) Proper set-up of Network Streaming Equipment.
      - 3) Testing of Network Streaming Equipment.

#### 2.2 SYSTEM

#### A. Design Criteria:

- 1. Video distribution system refers but is not limited to following components:
  - a. Satellite dish, LNB, receiver, line amplifiers, video and audio processors, video switchers, cable, connectors and ancillary equipment necessary to successful reception and distribution of video and audio signal from the selected reception device (satellite and/or video stream).
  - b. Owner Furnished Network Streaming Equipment.
- Intent of this specification is that receiving system will receive broadcasts from network streaming device and/or satellite currently in use by Church and provide video, audio, and video signal distributed properly throughout system.
- 3. System shall be fully function and complete video distribution system using equipment and materials of types, sizes, rating, and performances as indicated in Contract Drawings and following requirements:
  - a. Equipment and materials shall comply with manufactures' standard design and construction in accordance with published product data and in compliance with referenced standards.
  - b. Equipment and materials are to be integrated with components and connections functions at optimum performance.
  - c. Setup shall be optimized for display resolutions matching owner furnished display devices.

## B. Manufacturers Contact List:

- 1. Category Four Approved Components as shown on Contract Drawings from following manufacturers. See Section 01 6200 for definitions of Categories:
  - a. Anderson Manufacturing, Idaho Falls, ID (800) 635-6106 or (208) 523-6460.
  - b. Atlas Sound, Ennis, TX www.atlassound.com.
  - c. Belden Wire & Cable Co, Richmond, IN www.belden.com.
  - d. Blonder Tongue Laboratories Inc, Old Bridge, NJ www.blondertongue.com.
  - e. California Amplifier, Camarillo, CA www.calamp.com.
  - f. Chatsworth, Westlake Village, CA www.chatsworth.com.
  - g. CommScope Inc., Hickory NC www.commscope.com.
  - h. EFI Electronics, Salt Lake City, UT www.efinet.com.
  - i. EMTECH Electronics Inc, Lindon, UT www.emtechelectronics.com.
  - j. Extron, Anaheim, CA, www.extron.com.
  - k. HellermannTyton, Milwaukee, WI www.hellermann.tyton.com.
  - I. Holland Electronics, Ventura CA www.hollandelectronics.com.
  - m. Hubbell Inc, Orange, CT www.hubbell-wiring.com.
  - n. Leviton Manufacturing Co, Little Neck, NY www.leviton.com.
  - o. Norsat, Richmond, BC www.norsat.com.
  - p. Pelco, Clovis, CA www.pelco.com.
  - q. Pico Macom Inc, Lakeview Terrace, CA www.picomacom.com.
  - r. Prodelin Corp, Conover, NC www.prodelin.com.
  - s. PSP Products Inc, West Valley City, UT www.pspproducts.com.
  - t. Radio Design Labs, Carpenteria, CA www.rdlnet.com.
  - u. Ramko Research Inc, Rancho Cordova, CA (800) 678-1357 or (916) 635-3600.
  - v. Sony, New York, NY http://pro.sony.com.
  - w. Surgex, Knightdale, NC www.surgex.com.

- x. RMS Electronics Inc, Secaucus, NJ (800) 223-8312 or (201) 288-8833.
- y. Switchcraft, Chicago, IL www.switchcraft.com.
- z. TII Network Technologies, Edgewood, NY www.tiinetworktechnologies.com.
- aa. Times Fiber Communications, Wallingford, CT www.timesfiber.com.
- bb. TV One. Erlanger. KY www.tvone.com.
- cc. Vicon Industries Inc, Hauppage, NY www.vicon-cctv.com.
- dd. Wegener Communications, Duluth, GA www.wegener.com.
- ee. West Penn Wire Corp, Washington, PA www.westpenn-cdt.com.

#### C. Materials:

- 1. Video Components as specified on TA (Technology Audiovisual) Drawings as shown in Contract Documents.
- 2. Steel Base Pipe (Satellite System):
  - a. Galvanized steel pipe meeting requirements of ASTM A53/A53M, Type E or S, Grade B.
    - 1) Weight Class, STD, Schedule 40.
    - 2) Finishes: Shop prime steel.

#### PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Approved Installers:
  - 1. Category Four Approved Installers. See Section 01 6200 for definitions of Categories:
    - a. Qualifications:
      - 1) Meet qualification requirements as specified in Quality Assurance in Part 1 of this specification.
    - b. General Communications: (801) 266-5731.
    - c. Marshall Industries: (801) 266-2428.
    - d. Poll Sound: (801) 261-2500.
    - e. Professional Systems Technology: (801) 649-6696.

## 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify compliance with following items before beginning work of this Section:
    - a. Assure that antenna clears every obstacle and has clear line-of-sight to United States domestic-arc satellites. If there are obstructions, report to Architect before proceeding.
    - b. No cables spliced.
    - c. Specified cables and equipment cabinets are properly installed.
  - Verify all site conditions are in compliance with requirements for proper installation and function of video system work.

## 3.3 INSTALLATION

- A. Owner Furnished Equipment:
  - 1. Network Streaming Equipment:
    - a. Install and setup Owner Furnished Network Streaming Equipment.
  - 2. Extended Display Identification Data (EDID):
    - a. Set all specified EDID capable devices for Owner Furnished Display Device resolutions and sync signals including installation and setup.
- B. General:
  - 1. Install system in accordance with NFPA 70 'National Electrical Code', NFPA 72 'National Fire Alarm and Signaling', and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
- C. Satellite Dish Antenna:
  - 1. Supply and install as shown on Contract Drawings in conjunction with Manufacturer's instructions.
  - 2. Orient to satellite currently used by Church using L-band spectrum analyzer.
  - 3. Roof Mounted Antenna for low-slope roofs if shown on Construction Drawings:
    - a. Mount Antenna to roof using non-penetrating roof mount, specified on Construct Drawings.

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- b. Place Antenna on top rubber roof pad, 1/8 inch minimum.
- Install additional ballast in uniformly distributed manner, on non-penetrating mount frame. Total weight of mount, antenna and ballast shall weigh between 590 lbs and 620 lbs

## D. Equipment Cabinet:

- 1. File smooth exposed rough edges after cutting and drilling. Do not allow sharp screws to protrude from cabinet.
- 2. Install vent panels at top and bottom of equipment cabinets. In addition, install vent panels above and below satellite receiver and between other components, where possible, for maximum ventilation.
- 3. Securely fasten equipment plumb and square in place. Utilize all fastening holes in front of cabinet.
- 4. Securely fasten in place equipment that is not rack mounted, including relays and other small components. Do not use sticky-back tape.
- 5. Install balancing / isolation transformer when balanced and unbalanced components are connected.
- 6. Wire XLR-type connections with pin 2 hot, pin 1 shield.
- 7. Connect powered components to 120 VAC outlets on voltage suppressor power bars. Do not connect to outlets on other components.
- 8. Identification:
  - Legibly identify user-operated system controls and system input/output jacks using engraved, permanently attached laminated plastic plates or imprinted Lexan labels. Label equipment and controls within equipment cabinets using similar labels or printed labels from a label maker or laser printer.
  - b. Affix label to rack panel in cabinet listing name and telephone number of installer. Appropriate warranty instructions may be included.

## E. Cables, Wires, And Connectors:

- Cables:
  - a. Cable and wire shall be new and unspliced.
  - b. Splicing
    - 1) Splicing of cables and conductors is expressly prohibited in any location other than equipment racks.
    - 2) Splicing of control and speaker level conductors shall be accomplished via punch block or terminal strip connections only.
  - c. Additional cable length shall be provided at all connector locations. Duplex box, junction box, and floor box locations shall be installed with sufficient cable length behind cover plates to permit wiring maintenance and connector replacement in the future.
  - d. When cable runs utilize vertical cable raceways located within walls, acoustic integrity of walls shall be maintained:
    - Cables that pass-through cover plates of junction boxes and raceways, through slab-to-slab walls, and through conduit lines shall be properly gasketed and sealed. Acoustic material shall be restored or replaced.
  - e. Separation between system cables and other services shall be maximized to prevent and/or minimize potential for electro-magnetic interference (EMI):
    - 1) Provide at least 12 inches separation from electrical lines whenever feasible.
    - 2) Where separation is unavoidable, distribution cables shall cross other services at right angles whenever practical to minimize EMI.
  - f. Do not install signal cables on top of light fixtures, ceiling speakers, video projector lifts, projection screens, HVAC controls or sensing devices, fire safety and sprinkler system detection technology, or any other technology or mechanical equipment.
  - g. Do not lay cables directly on top of T-bar grid ceiling tiles:
    - 1) Support cables installed outside of conduit at 4 feet maximum intervals from building structure.
    - 2) Do not utilize support wires from other trades or systems.
  - h. Install system cables shall not block access to other equipment or services, across removable service panels and/or in any other manner to prohibit routine maintenance of HVAC systems, fire safety equipment and building mechanical control systems.
  - i. Inter-rack cabling:
    - 1) Inter-rack cabling shall be neatly laced, dressed, strain relieved and adequately supported.
    - 2) Inter-rack cables shall be grouped according to signals being carried to reduce signal contamination. Separate groups shall be formed for following:
      - a) Power.
      - b) Control.
      - c) Video.
      - d) Audio cables carrying signals less than -20 dBM.
      - e) Audio cables carrying signals between -20 dBM and +20 dBM.
      - f) Audio cables carrying signals over +20 dBM.
  - j. Power cables, control cables, and high level cables shall be run on left side of equipment racks as viewed from rear. All other cables shall be run on right side of all equipment racks as viewed from rear.

- k. Cables must be cut to electrical length, shall be cut to length dictated by cable run.
- I. Terminal blocks, boards, strips or connectors, shall be furnished by installer for all cables which interface with racks, cabinets, consoles, or equipment modules. Affix terminal blocks, boards, strips or connectors to equipment racks using screws only. Double sided tape will not be accepted.
- m. Shields for audio cables shall be grounded at input end only of various equipment items on system to prevent potential for ground loops.

## 2. Wiring and Cabling:

- a. Comply with industry standard circuit polarity and loudspeaker wiring polarity. No cables shall be terminated with polarity reversal between connectors at either end.
- b. System wire, after being cut and stripped, shall have wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. No bare wire ends shall be accepted.
- c. Do not place any wires and cables for this system in any conduit, raceway, wire way or cable tray that is used for mechanical systems of building.
- d. Route all cable and wiring within equipment racks, cabinets and millwork according to function, separating wires of different signal levels (microphone, line level, amplifier output, AC, control, etc.) by as much distance as possible. Neatly arrange, harness and bundle all cable with Velcro straps.
- After completion of wiring and cable installation, all trough and box covers shall be notched out and grommeted for clearance of various cable bundles, (i.e., separate audio, video, and control). Panel covers shall be screwed back in place and all gaskets shall be restored or replaced.

#### 3. Connectors:

- a. Provide connectors of type and quality as detailed in Contract Drawings and/or as required to meet minimum bandwidth requirements of equipment to which connectors are terminated. Overall quantity of connectors shall not be limited by quantities indicated in Contract Drawings and shall be provided as required.
- No connectors shall be installed in non-accessible locations or used for splicing cables. Connectors shall be new.
- c. Connectors shall incorporate strain relief mechanisms which firmly grip the jacket of connected cables.
- d. Connectors shall be properly polarized to prevent improper seating.
- e. Connectors shall provide appropriate electrical characteristics for circuitry to which they are attached.
- f. Exposed conductors inside of equipment racks shall be dressed with heavy duty neoprene heat-shrink tubing.
- g. Heat-shrink type tubing shall be used to insulate and dress ends of all wire and cables including separate tube for ground or drain wire.
- h. Solder connections shall be made with rosin-core solder. Temperature controlled soldering irons rated at least 60 watts shall be used for all soldering work. No soldering guns, gas or butane, or temperature unregulated irons shall be used on job site.
- i. Mechanical connections shall be made with approved crimp lugs of correct size and type for connection. Wire nuts shall not be permitted except inside speaker enclosures. Each connector shall be attached with proper size controlled-duty-cycle ratcheting crimp tool approved by manufacturer.
- j. Conventional non-ratcheting type crimping tools are unacceptable and shall not be used on job site. Presence of such tools on job site shall constitute evidence of mechanical connections made with unauthorized tools and shall provide sufficient grounds for rejection of all mechanical connections in system and will be considered non-conforming work.

## F. Mounting And Securing Equipment:

- 1. Equipment shall be firmly secured in place unless requirements of portability dictate otherwise.
- 2. Fastenings and supports shall be adequate to support their loads with safety factor of at least three (3) times weight of equipment being installed.
- 3. Any structural mounting that is not able to meet this requirement due to specific nature of equipment, manufacturer's requirements or limitations of facility, shall not be installed without prior approval of Engineer.
- 4. Install all boxes, equipment, hardware, and other materials plumb, level, and square.

#### G. Millwork:

- 1. Install technology equipment and support equipment in podium, and other millwork in neat and cosmetically dressed out manner.
- 2. Saw cuts, holes and recesses into laminates and woodwork shall be straight.
- 3. Radius and circular cuts shall be consistent, and all uneven surfaces shall be corrected. This shall include use of moldings, grommets, bushings, laminates, and wood products as required to dress out installation of equipment.
- 4. Verify installation of equipment and panels in technology racks and podiums are completed by using matching screws, hardware and grommets.

## H. Technology:

1. Provide sufficient ventilation for adequate cooling of equipment.

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- 2. Install vent rack panels in unused spaces. Install vent panels at top and bottom and above each power amplifier.
- 3. Securely fasten equipment plumb and square in place. Where equipment is installed in rack cabinets, utilize all fastening holes and cove open spaces with perforated panels.
- 4. Securely fasten relays and small components. Do not use sticky-back tape for fasteners.
- 5. Install balancing transformer on each unbalanced input or output that connects to devices outside equipment cabinet, or that connects to balanced input or output within equipment cabinet.
- 6. Connect powered components to 120 VAC outlets on transient voltage surge suppressors. Do not connect to outlets on other components.
- Leave sufficient service loops to uniform length on cables to allow operation of system with chassis outside cabinet.
- 8. Equipment shall be held firmly in place with proper types of mounting hardware as recommended and/or supplied by manufacturer:
  - a. Mounting hardware provided with equipment shall be used when practical. This shall include, but not be limited to, front and rear rack rails, angle brackets and rack mount kits.
  - b. Equipment shall be installed so as to provide reasonable safety to operator.

#### 3.4 SYSTEM SETUP

- A. Digital Video System Setup:
  - 1. Pulpit HDMI and VGA Input (DTP T UWP 332D):
    - a. Set Transmitter to Auto Switch between inputs, by shorting Contact Pins 1 and 2 to ground.
- B. Rack Mounted DTP Receiver (DTP HDMI 330 RX):
  - 1. Connect HDMI and Analog audio outputs to respective inputs on DTP switcher.
- C. Video Switcher 'VS' Audio Setup:
  - 1. Inputs:
    - a. Video Input 2 must be set to Analog.
    - b. Video Input 3 must be set to Multi-Ch Auto, system will automatically switch between analog and digital audio inputs when Input 3 is selected.
    - c. Video Input 4 must be set to Multi-Ch Auto, system will automatically switch between analog and digital audio inputs when Input 4 is selected.
    - d. Video Input 5 must be set for LPCM-2Ch Auto.
    - e. Mic/Line Inputs 1 and 2 shall be muted.
  - 2. Outputs:
    - a. Input 1 and 6 must be set with preset which mutes analog audio outputs to Chapel when either input 1 or 6 is selected.
    - b. All other inputs must be set up to unmute analog outputs.
    - c. Input 5 must be configured to pass Left Program on Left Channel, Right Program on Right Channel.
    - d. Variable analog output should be setup to pass 'No Program'.
    - e. Digital Outputs must be setup for 'Stereo Program'.
- D. Video Switcher 'VS' Video Setup:
  - 1. Input Configuration:
    - a. All inputs shall be labeled in software according to inputs connected to them.
    - b. Input 1's selected signal type shall match Camera's Native Signal Output. IF no camera is installed, Signal type shall be set to composite.
    - c. Input 2's signal type shall be set to RGB.
    - d. Aspect Ratio for Inputs 2 and 5 shall be set to follow, all others shall be set to fill.
    - e. All Inputs shall be set to auto image, auto memory, HDCP authorized, and Film Detect.
  - 2. Output Configuration:
    - a. Set output Configuration to 1920x1200 @ 60 Hz.
    - b. Set Output Format for Auto for each output group.
    - c. Set Transitions to 'CUT'.
  - 3. General Settings:
    - a. Screen Saver shall be set to Blue with OSD Bug.
    - b. Select display color when sending HDCP content on non-compliant device to Green.
    - c. Set front Panel Lock out to Mode 2, allowing only input selection and volume controls.
    - d. Set HDCP mode to Follow Input.

## 3.5 FIELD QUALITY CONTROL

## A. Field Tests:

- Installer Testing:
  - a. Upon completion of installation and before inspection by Audiovisual Consultant, test functions verifying following. Make necessary corrections:
    - 1) System is free from hum, noise, ghosting, loose parts and poor construction or soldering.
    - Video signals shall be clear, sharp, noise-free picture with good chroma and undistorted, noise free audio.
    - 3) Audio to sound system is undistorted and noise free.
  - b. Complete documentation required by Audiovisual Consultant and submit to consultant within five (5) days of Substantial Completion.

## B. Field Inspections:

- 1. Audiovisual Consultant Inspection:
  - a. Coordinate final inspection schedule with Audiovisual Consultant two (2) weeks minimum before Consultant's final inspection.
  - b. Have copy of Installer redlined documents sent to Audiovisual Consultant two (2) weeks minimum to before field inspection.
  - c. Provide following test equipment in good working order:
    - 1) Digitally generated video test signal generator:
      - a) Generator shall provide minimum of but not be limited to industry standard test signals including color bar patterns, grey scale, alternating pixel, cross hatch and H-pattern.
      - b) Generator shall provide resolutions compatible with all specified video equipment.
      - c) Generator shall provide resolutions up to 1920 x 1200.
    - 2) Digital Volt-Ohmmeter.
    - 3) Necessary chargers, cable, test leads, adapters and other accessories for test equipment.
  - d. Ensure Owner Furnished Display Devices such as projectors and video monitors are available and on site at time of inspections.
  - e. Correct minor items so Audiovisual Consultant may certify satisfactory completion without return trip.

## C. Non-Conforming Work:

 Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

## D. Manufacturer Services:

1. Provide services of factory authorized service representative to supervise field assembly and connection of components and pretesting, testing, and adjustment of system.

## 3.6 CLEANING

- A. Waste Management:
  - 1. All work areas are to be kept clean, clear and free of debris at all times.
  - 2. Disposal of rubbish, debris, and packaging materials to Contractor provided Dumpster.

## END OF SECTION

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# SECTION 27 5117 AUDIO SYSTEMS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete and operational sound system as described in Contract Documents including:
    - a. Complete systems for amplifying sound signals from microphones and media source equipment and distributing them to loudspeakers at various locations.
  - 2. Assist Audiovisual Consultant with final inspection and equalization of system and provide necessary test equipment for audio system and partition noise isolation tests if applicable. Correct problems found at time of final inspection of system.
- B. Related Requirements:
  - 1. Division 26 'Electrical':
    - a. Raceway, boxes, and installation of speaker enclosures and mounting rings furnished by Division 27.
    - b. Power to equipment location and power relay wiring if applicable.
  - 2. Section 27 1116: 'Communications Cabinet, Racks, Frames, and Enclosures'.
  - 3. Section 27 1501: 'Communications Horizontal Cabling'.
  - 4. Section 27 4117: 'Video Systems'.
  - 5. Audiovisual Consultant will perform final inspection, system balance, equalization, and instruct local leaders in operation of system.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Webcast Communicator or Webcast Capable Device.
- D. Related Requirements:
  - 1. Section 01 6400: Owner will furnish Webcast Communicator or Webcast Capable Device such as personal computer or laptop. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.

## 1.2 REFERENCES

- A. Association Publications:
  - 1. Building Industry Consulting Service International (BISCI):
    - a. Information Transport Systems Installation Methods Manual (ITSIMM) (5th Edition).
    - b. *Telecommunications Distribution Methods Manual* (TDMM) (12<sup>th</sup> Edition).
  - 2. InfoComm International Association:
    - a. Audiovisual Best Practices: The Design & Integration Process for the AV and Construction Industries.
    - b. AV Design Reference Manual (1st Edition, 2006).
    - c. Basics of Audio and Visual Systems Design (2003).
  - 3. Institute of Electrical and Electronics Engineers:
    - a. IEEE 1100-2005, 'Recommended Practice for Powering and Grounding Electric Equipment'.
- B. Reference Standards:
  - 1. American National Standards Institute/InfoComm International Association:
    - a. ANSI/INFOCOMM 1M:2009, 'Audio Coverage Uniformity in Enclosed Listener Areas'.
    - b. ANSI/INFOCOMM 2M:2010, 'Standard Guide for Audiovisual Systems Design and Coordination Processes'.
    - c. ANSI/INFOCOMM 4:2012, 'Audiovisual Systems Energy Management'.
  - 2. National Fire Protection Association:
    - a. NFPA 70: 'National Electrical Code (NEC)' (2014 Edition).
    - b. NFPA 72: 'National Fire Alarm and Signaling Code' (2016 Edition).
  - 3. Telecommunications Industry Association:
    - a. TIA-568-C.2, 'Balanced Twisted-Pair Telecommunications Cabling and Components Standards' (Revision C, 2009).
    - b. TIA-569, 'Telecommunications Pathways And Spaces' (Revision D, 2015).

- c. TIA-606, 'Administration Standard for Telecommunications Infrastructure' (Revision B, 2012).
- d. TIA-607, 'Telecommunications Bonding and Grounding (Earthling) for Customer Premises' (Revision C, 2015).
- e. TIA-758, 'Customer-Owned Outside Plant Telecommunication Infrastructure Standard' (Revision B, 2012).
- 4. Underwriters Laboratories (UL):
  - a. UL 486A-486B, 'Wire Connectors' (January 2013).

## 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

 Coordinate final inspection schedule of both audio and video systems before Audiovisual Consultant's final inspection.

#### B. Schedule:

- 1. After completion of audio system installation of this section, Installer to perform Field Testing before Audiovisual Consultant Final Inspection of audio system.
- 2. Notify Audiovisual Consultant two (2) weeks minimum before Audiovisual Consultant's final inspection as specified in Field Quality Control in Part 3 of this specification.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Special Procedure Submittals:
    - a. Provide itemized list of equipment to be supplied.
    - b. Provide proposed labeling for system components.
  - 2. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation as requested by Engineer/Architect including:
        - a) List of Projects requested.
        - b) List of certified technician(s) with dates of training courses completed.

#### B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Equipment Manufacture's manual:
      - a) Audio system operation and maintenance instructions.
      - List of equipment provided, including portable equipment, showing make, model, and serial number.
  - b. Warranty Documentation:
    - 1) Include copy of final, executed warranty.
  - c. Record Documentation:
    - 1) Software and Programming: Copies of all manufacturers' software used for programming various components and functions of the system shall be furnished to the Owner:
      - a) Original audio processor program files, source codes and compiled codes used for system control, audio setup and any other computerized functions of system including screen layout generation, configuration and layouts and any other related computer files shall also be furnished to Owner.
      - b) In each and every case, all programming, code generation, configuration files, layout files and any other software and/or code written and generated of setup and operation of this system are property of Owner of system and not of Audiovisual Consultant, Contractor or Integrator.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall be installed in accordance with applicable standards, requirements, and recommendations of International Building Code, National Electrical Code and all local authorities having jurisdiction.
- B. Qualifications:
  - 1. Installer. Requirements of Section 01 4301 applies, but not limited to following:

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- a. Approved Installers:
  - 1) Installers are to furnish and install components of audio system and meet qualification requirements.
  - 2) Approval subject to agreement process for Pre-Approval Installers.
- b. Alternate Installer(s):
  - 1) Firm specializing in performing work of this section:
    - a) Minimum three (3) years of successful installation experience of AV system projects of comparable size, and complexity required for this project. Audio systems must have included complete installation and setup work and must have been completed by factory trained and certified technician.
    - b) Firm successfully completed minimum of three (3) projects in past two (2) years before bidding.
    - Firms must have certified technician that has successfully completed all relevant training courses recommended by manufacturers and proficient of all specified equipment of this section
    - d) Comply with specifications and Contract Documents.
  - Submit documentation of compliance of qualifications before bid to Architect or Owner's Representative.
- c. Same Approved Installer shall furnish and install components of Section 27 1116 'Communications Cabinets, Racks, Frames and Enclosures' and Section 27 4117 'Video Systems'.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Provide secure location protected from weather in cool, dry location, out of direct sunlight in compliance with Manufacturer's instructions and recommendations.
  - 2. Keep materials free from dirt and foreign matter.

#### 1.7 WARRANTY

- A. Special Warranty:
  - 1. Provide complete warranty repair or replacement for one (1) year at no cost to Owner, except in case of obvious abuse.
  - If failure causes Chapel or Cultural Center audio system to be inoperative or unusable for its intended purpose, Installer, when notified of problem before Wednesday, shall repair system so it will be operational and usable by following Sunday. If defective components cannot be repaired in time, furnish and install temporary loaner equipment as required.
  - 3. Honor component warranties for term established by Manufacturer, if greater than one (1) year.

## PART 2 - PRODUCTS

## 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1. Webcast Communicator or Webcast Capable Device.

## 2.2 SYSTEM

- A. Manufacturers Contact List:
  - Category Four components as shown on Drawings from following Manufacturers. See Section 01 6200 for definition of Categories.
    - a. Atlas Sound, Phoenix, AZ www.atlassound.com.
    - b. Audio-Technica US Inc., Stow, OH www.audio-technica.com.
    - c. Belden Wire & Cable Co, Richmond, IN www.belden.com.
    - d. BSS Audio, Sandy, UT www.bssaudio.com.
    - e. Chatsworth, Westlake Village, CA www.chatsworth.com.

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- f. Community Professional Loudspeakers, Chester, PA www.communitypro.com.
- g. COMTEK Inc, Salt Lake City, UT www.comtek.com.
- h. Conquest Sound Co, Tinley Park, IL www.conquestsound.com.
- i. Crown Audio Inc, Elkhart, IN www.crownaudio.com.
- j. Countryman, Menlo Park, CA www.countryman.com.
- k. EIKI International, Laguna Nigel, CA www.eiki.com.
- I. Electro-Voice Inc, Burnsville, MN www.electro-voice.com.
- m. Emtech Electronics Inc, Orem, UT www.emtechelectronics.com.
- n. Extron, Anaheim, CA www.extron.com.
- o. HellermannTyton, Milwaukee, WI www.hellermann.tyton.com.
- p. Hubbell Inc, Orange, CT www.hubbell-wiring.com.
- q. IVIE Technologies Inc, Lehi, UT www.ivie.com.
- r. JBL Professional, Northridge, CA www.jblpro.com.
- s. König & Meyer, Wertheim, Germany www.k-m.de/en.
- t. Leviton Manufacturing Co, Little Neck, NY www.leviton.com.
- u. Liberty AV Solutions, Colorado Springs, CO www.libertycable.com.
- v. Lowell Manufacturing Co, Pacific, MO www.lowellmfg.com.
- w. Middle Atlantic Products, Fairfield, NJ www.middleatlantic.com.
- x. Neutrik USA Inc, Lakewood, NJ (732) 901-9488. www.neutrikusa.com.
- y. Newark Electronics, Sola and Triad, Chicago, IL www.newark.com.
- z. QSC Audio Products, Costa Mesa, CA www.gscaudio.com.
- aa. Radio Design Labs, Carpenteria, CA www.rdlnet.com.
- bb. Rane Corp, Mukilteo, WA www.rane.com.
- cc. Shure Brothers, Evanston, IL www.shure.com.
- dd. SoundTech, Mundelein, IL www.soundtech.com.
- ee. Soundtube Entertainment, Park City, UT www.soundtube.com.
- ff. Surgex, Knightdale, NC www.surgex.com.
- gg. Switchcraft, Chicago, IL www.switchcraft.com.
- hh. TOA Electronics, South San Francisco, CA www.toaelectronics.com.
- ii. TV One, Erlanger, KY www.tvone.com.
- ij. Whirlwind Music Distributors, Inc., Rochester, NY www.whirlwindusa.com.
- kk. Wireworks Corp, Hillside, NJ www.wireworks.com.

## B. Performance:

- 1. Capabilities:
  - a. Installations with audio DSP shall meet following performance parameters:
    - 1) From 100 Hz to 2 kHz, flat within plus or minus 2 dB.
    - 2) Above 2 kHz, slope down along an approximate 3 dB per octave slope to 8 kHz.
  - b. No noise, hum, RFI pickup or distortion shall be audible under normal operating conditions.
  - c. Audio systems shall reproduce program material at level of 80 to 85 dBA without audible distortion.
  - d. All input levels shall be pre-set so system may be operated without going into feedback under normal conditions.
  - e. Seat-to-seat variations in the 4kHz octave band shall not exceed plus or minus 2 dB in the Chapel or Cultural Center.
  - f. Sound masking system:
    - Sound masking system shall provide adequate speech privacy in Corridor when set between 42 dBA and 46 dBA at ear-height under speaker so conversation in Office at slightly raised voice levels cannot be understood in Corridor.

## C. System Requirements:

- 1. General:
  - a. Provide complete and fully functional audio systems using materials and equipment of types, sizes, ratings, and performances as indicated in equipment list in accompanying drawings:
    - 1) Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction in accordance with published product information.
    - 2) Coordinate features of materials and equipment so they form integrated system with components and interconnections matched for optimum performance of specified functions.
- 2. Provide all wire, cable, and connectors as required to complete installation of all systems as designed and specified.

## D. Equipment And Materials:

1. General:

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- Provide equipment selected from equipment list on drawings, or as substituted following proscribed substitution process, using all solid state components fully rated for continuous duty at ratings indicated or specified.
- b. Select equipment for normal operation on input power supplied at 105 130 V, 60 Hz.

## PART 3 - EXECUTION

#### 3.1 INSTALLERS

- A. Approved Installers:
  - 1. Category Four Approved Installers. See Section 01 6200 for definitions of Categories:
    - Qualifications
      - 1) Meet qualification requirements as specified in Quality Assurance in Part 1 of this specification.
    - b. General Communications: (801) 266-5731.
    - c. Marshall Industries: (801) 266-2428.
    - d. Poll Sound: (801) 261-2500.
    - e. Professional Systems Technology: (801) 649-6696.

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Verify compliance with following items before beginning work of this Section:
    - a. No cables spliced.
    - b. Isolated ground run back to electrical panel from all equipment cabinets.
    - c. Specified conduit, cables, speaker enclosures and equipment cabinets are properly installed.
    - d. Location and angle of speaker cabinets.
  - 2. Ensure that no solid structural or decorative member impedes sound propagation from speakers and that no member with cross section greater than 3/4 inch is placed in front of speakers.
  - 3. Verify installation of fiberglass insulation in field-fabricated speaker enclosures.

## 3.3 INSTALLATION

## A. General:

- 1. Install system in accordance with NFPA 70 'National Electrical Code', NFPA 72 'National Fire Alarm and Signaling', and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
- B. Mounting And Securing Equipment:
  - 1. Equipment shall be firmly secured in place unless requirements of portability dictate otherwise.
  - 2. Fastenings and supports shall be adequate to support their loads with safety factor of at least three (3) times weight of equipment being installed.
  - 3. Any structural mounting that is not able to meet this requirement due to specific nature of equipment, manufacturer's requirements or limitations of facility, shall not be installed without prior approval of Engineer.
  - 4. Install all boxes, equipment, hardware, and other materials plumb, level, and square.

#### C. Millwork:

- 1. Install technology equipment and support equipment in millwork in neat and cosmetically dressed out manner.
- 2. Install technology equipment and support equipment in podium and other millwork in neat and cosmetically dressed out manner.
- 3. Saw cuts, holes and recesses into laminates and woodwork shall be straight.
- 4. Radius and circular cuts shall be consistent, and all uneven surfaces shall be corrected. This shall include use of moldings, grommets, bushings, laminates, and wood products as required to dress out installation of equipment.
- 5. Install equipment and panels in technology racks and podiums using matching screws, hardware and grommets.

## D. Speakers:

- Maintain uniform polarity in speakers and wiring.
- 2. Employ no positive stop in rotation of speaker volume controls. Controls shall be capable of continuous rotations in either direction.

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- 3. Mount transformers with screws securely to speaker brackets or enclosures. Adjust torsion springs as necessary to securely support speaker assembly.
- 4. Neatly mount speaker grilles, panels, connector plates, control panels, etc., tight, plumb, and square unless indicated otherwise on drawings.
- 5. Provide brackets, screws, adapters, springs, rack mounting kits, etc, recommended by manufacturer for correct assembly and installation of speaker assemblies and electronic components.
- Line factory-fabricated speaker back boxes with one inch minimum fiberglass if not done by Back box Manufacturer
- 7. Speaker Back Boxes shall be secured to structure using 12 ga minimum seismic safety cables.

#### E. Technology

- 1. Provide sufficient ventilation for adequate cooling of equipment.
- 2. Install vent rack panels in unused spaces. Install vent panels at top and bottom and above each power amplifier.
- 3. Securely fasten equipment plumb and square in place. Where equipment is installed in rack cabinets, utilize all fastening holes and cove open spaces with perforated panels.
- 4. Securely fasten relays and small components. Do not use sticky-back tape for fasteners.
- 5. Install balancing transformer on each unbalanced input or output that connects to devices outside equipment cabinet, or that connects to balanced input or output within equipment cabinet.
- 6. Connect powered components to 120 VAC outlets on transient voltage surge suppressors. Do not connect to outlets on other components.
- 7. Leave sufficient service loops to uniform length on cables to allow operation of system with chassis outside cabinet.
- 8. Equipment shall be held firmly in place with proper types of mounting hardware as recommended and/or supplied by manufacturer:
  - a. Mounting hardware provided with equipment shall be used when practical. This shall include, but not be limited to, front and rear rack rails, angle brackets and rack mount kits.
  - Equipment shall be installed so as to provide reasonable safety to operator.

## F. Cables, Wires, And Connectors:

- Cables:
  - a. Cable and wire shall be new and unspliced.
  - b. Splicing:
    - 1) Splicing of cables and conductors is expressly prohibited in any location other than equipment racks.
    - Splicing of control and speaker level conductors shall be accomplished via punch block or terminal strip connections only.
  - c. Additional cable length shall be provided at all connector locations. Duplex box, junction box, and floor box locations shall be installed with sufficient cable length behind cover plates to permit wiring maintenance and connector replacement in the future.
  - d. When cable runs utilize vertical cable raceways located within walls, acoustic integrity of walls shall be maintained:
    - Cables that pass-through cover plates of junction boxes and raceways, through slab-to-slab walls, and through conduit lines shall be properly gasketed and sealed. Acoustic material shall be restored or replaced.
  - e. Separation between system cables and other services shall be maximized to prevent and/or minimize potential for electro-magnetic interference (EMI):
    - 1) Provide at least 12 inches separation from electrical lines whenever feasible.
    - 2) Where separation is unavoidable, distribution cables shall cross other services at right angles whenever practical to minimize EMI.
  - f. Do not install signal cables on top of light fixtures, ceiling speakers, projection screens, HVAC controls or sensing devices, fire safety and sprinkler system detection technology, or any other technology or mechanical equipment.
  - g. Do not lay cables directly on top of T-bar grid ceiling tiles:
    - 1) Support cables installed outside of conduit at 4 feet maximum intervals from building structure.
    - 2) Do not utilize support wires from other trades or systems.
  - h. Install system cables shall not block access to other equipment or services, across removable service panels and/or in any other manner to prohibit routine maintenance of HVAC systems, fire safety equipment and building mechanical control systems.
  - i. Inter-rack cabling:
    - 1) Inter-rack cabling shall be neatly laced, dressed, strain relieved and adequately supported.
    - Inter-rack cables shall be grouped according to signals being carried to reduce signal contamination.
       Separate groups shall be formed for following:
      - a) Power.
      - b) Control.
      - c) Video.

- d) Audio cables carrying signals less than -20 dBM.
- e) Audio cables carrying signals between -20 dBM and +20 dBM.
- f) Audio cables carrying signals over +20 dBM.
- j. Power cables, control cables, and high-level cables shall be run on left side of equipment racks as viewed from rear. All other cables shall be run on right side of all equipment racks as viewed from rear.
- k. Cables, except video cables which must be cut to electrical length, shall be cut to length dictated by cable run.
- I. Terminal blocks, boards, strips or connectors, shall be furnished by installer for all cables which interface with racks, cabinets, consoles, or equipment modules. Affix terminal blocks, boards, strips or connectors to equipment racks using screws only. Double sided tape will not be accepted.
- m. Shields for audio cables shall be grounded at input end only of various equipment items on system to prevent potential for ground loops.
- n. Shields for microphone cables shall be grounded at both ends to allow Phantom Power to pass.

## 2. Wiring and Cabling:

- a. Comply with industry standard circuit polarity and loudspeaker wiring polarity. No cables shall be terminated with polarity reversal between connectors at either end.
- b. System wire, after being cut and stripped, shall have wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. No bare wire ends shall be accepted.
- c. Do not place any wires and cables for this system in any conduit, raceway, wire way or cable tray that is used for mechanical systems of building.
- d. Route all cable and wiring within equipment racks, cabinets and millwork according to function, separating wires of different signal levels (microphone, line level, amplifier output, AV, control, etc.) by as much distance as possible. Neatly arrange, harness and bundle all cable with velcro straps.
- e. After completion of wiring and cable installation, all trough and box covers shall be notched out and grommeted for clearance of various cable bundles, (i.e., separate audio, video, and control). Panel covers shall be screwed back in place and all gaskets shall be restored or replaced.

#### Connectors:

- a. Provide connectors of type and quality as detailed in Contract Drawings and/or as required to meet minimum bandwidth requirements of equipment to which connectors are terminated. Overall quantity of connectors shall not be limited by quantities indicated in Contract Drawings and shall be provided as required.
- b. No connectors shall be installed in non-accessible locations or used for splicing cables. Connectors shall be new
- c. Connectors shall incorporate strain relief mechanisms which firmly grip the jacket of connected cables.
- d. Connectors shall be properly polarized to prevent improper seating.
- e. Connectors shall provide appropriate electrical characteristics for circuitry to which they are attached.
- f. Exposed conductors inside of equipment racks shall be dressed with heavy duty neoprene heat-shrink tubing.
- g. Heat-shrink type tubing shall be used to insulate and dress ends of all wire and cables including separate tube for ground or drain wire.
- h. Solder connections shall be made with rosin-core solder. Temperature controlled soldering irons rated at least 60 watts shall be used for all soldering work. No soldering guns, gas or butane, or temperature unregulated irons shall be used on job site.
- i. Mechanical connections shall be made with approved crimp lugs of correct size and type for connection. Wire nuts shall not be permitted except inside speaker enclosures. Each connector shall be attached with proper size controlled-duty-cycle ratcheting crimp tool approved by manufacturer.
- j. Conventional non-ratcheting type crimping tools are unacceptable and shall not be used on job site. Presence of such tools on job site shall constitute evidence of mechanical connections made with unauthorized tools and shall provide sufficient grounds for rejection of all mechanical connections in system and will be considered non-conforming work.

#### G. Equipment Cabinet

- Install vent panels at top and bottom of equipment cabinets and between components where possible for maximum ventilation. Locate amplifiers at top of cabinet. Locate equalizers below amplifiers, separated by several vent panels.
- 2. Securely fasten equipment plumb and square in place. Utilize all fastening holes in front of cabinet.
- 3. Securely fasten in place equipment that is not rack mounted, including relays and other small components. Do not use sticky-back tape.
- 4. Install balancing / isolation transformer when balanced and unbalanced components are connected.
- 5. Wire XLR-type connections with pin 2 hot, pin 1 shield.
- 6. Connect powered components to 120 VAC outlets on voltage suppressor power bars. Do not connect to outlets on other components.

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#### 7. Identification:

- a. Legibly identify user-operated system controls and system input / output jacks using engraved, permanently attached laminated plastic plates or imprinted Lexan labels. Label equipment and controls within equipment cabinets using similar labels or printed labels from a label maker or laser printer.
- Affix label to rack panel inside cabinet listing name and telephone number of installer. Appropriate warranty instructions may be included.

## H. Identification And Labeling:

- 1. Cables, regardless of length, shall be identified with machine-printed wrap-around labeling system at both ends:
  - a. These labels shall be self-laminating to ensure durability.
  - b. Label format used shall be equal, or better than, system detailed.
- 2. There shall be no unmarked cables any place in system.
- 3. Marking codes used on cables shall correspond to codes provided with submittals, and/or written documentation of 'Record Drawings'.
- 4. Connectors, controls, equipment components, terminal blocks and equipment racks are to be permanently labeled in format approved during submittal process.
- 5. Equipment labels are to be permanently engraved in metal. Alternative method shall be approved during submittal process only.
- 6. Clearly and permanently label all jacks, controls, connections, and so forth. Embossed or printed label tape shall not be used and is considered unacceptable for this system. Attach labels with double stick tape as required.
- 7. Labeling shall be completed prior to acceptance of final system.

#### Grounding:

- 1. Provide equipment grounding connections for audio system as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A-486B to assure permanent and effective grounds.
- 2. Ground equipment, conductor, and cable shields to eliminate shock hazard and to eliminate ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5 ohm ground at main equipment location. Measure, record, and report ground resistance.
- Provide grounding conductor with green insulation between as indicated on Contract Drawings. Comply with IEEE and TIA standards.

## J. Pulpit:

- 1. Install pulpit microphone pre-amplifier to be accessible below lectern. Do not alter factory supplied microphone cable and connectors.
- Install pulpit microphone so tip of microphone head is 2 inches inside edge of lectern when microphone is tilted down to maximum extent.

#### K. Seismic Bracing:

1. Comply with IBC and local seismic requirements for all equipment and conduit pathways.

## 3.4 FIELD QUALITY CONTROL

## A. Field Tests:

- 1. Installer Testing:
  - a. After completion of installation but before inspection by Audiovisual Consultant, perform following:
    - 1) Conduct system tests and make necessary corrections for proper system operation including, but not limited to, following:
      - a) Output level uniformity.
      - b) Polarity.
      - c) Shock, strain excited hum, and oscillation.
      - d) Clipping, hum, noise, and RFI in all system configurations.
      - e) Speaker line impedances.
      - f) Loose parts and poor workmanship or soldering.
    - 2) Sweep speaker systems with high-level sine wave or 1/3 octave pink noise source. Correct causes of buzzes or rattles related to speakers or enclosures. Notify Contractor and Audiovisual Consultant of external causes of buzzes or rattles.
    - Rough Balance: Balance system well enough that it can be used for meetings before final inspection.
  - c. Complete documentation required by Audiovisual Consultant and submit to consultant within five (5) days of Substantial Completion.

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#### B. Field Inspections:

- 1. Audiovisual Consultant Inspection And Equalization:
  - a. Coordinate final inspection schedule with Audiovisual Consultant two (2) weeks minimum before Consultant's final inspection.
  - b. Have copy of Installer redlined documents sent to Audiovisual Consultant two (2) weeks minimum to before field inspection.
  - c. Have loose equipment (microphones, cables, etc.) available at time of inspection.
  - d. Assist Audiovisual Consultant in final inspection of completed system.
  - e. Assist Audiovisual Consultant in noise isolation testing of folding partitions and office doors.
  - f. Provide following test equipment in good working order:
    - 1) Laptop computer:
      - a) Operating System: Microsoft Window 7.
      - b) Processor: 2 GHz Dual-Core Intel Processor or faster (or compatible).
      - c) RAM: 2 GB or greater.
      - Video: Graphics processor with 128 M dedicated video RAM, minimum 1024x768 display or better.
      - e) Sound Hardware: Audio Hardware with OS compatible ASIO, Wav/WDB drivers, sample rate of up to 192kHz and bit-resolutions of up to 32. Bit,or better.
    - 2) 1/3 octave real-time audio spectrum analyzer with SPL meter, and precision microphone.
    - 3) Digitally generated random pink noise generator, 20Hz-20KHz, minimum two (2) hour repetition rate or ten (10) minutes minimum of equivalent signal recorded on compact disc.
    - 4) Direct reading audio impedance meter, minimum three (3) frequencies, and ten (10) percent accuracy.
    - 5) Digital Volt-Ohmmeter.
    - 6) Audio oscillator, variable frequency, 20Hz-20KHz.
    - 7) MP3 player with pre-recorded speech and music program material.
    - 8) Necessary chargers, cables, test leads, adapters, and other accessories for test equipment.
    - 9) Tools and spare parts for making adjustments and corrections to system.
    - 10) CAT-5 / RJ-45 continuity tester similar to Ideal 62-200 or Amprobe DCT-300.
  - g. Correct minor items so Audiovisual Consultant may certify satisfactory completion during his visit.

#### C. Non-Conforming Work:

1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

#### D. Manufacturer Services:

1. Provide services of factory authorized service representative to supervise field assembly and connection of components and pretesting, testing, and adjustment of system.

## 3.5 CLEANING

## A. Waste Management:

- 1. All work areas are to be kept clean, clear and free of debris at all times.
- 2. Disposal of rubbish, debris, and packaging materials to Contractor provided Dumpster.

## END OF SECTION

#### **ATTACHMENTS**

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## MEETINGHOUSE SOUND SYSTEM FUNCTIONALITY

Each of the sound system(s) should function as indicated

#### SOUND MASKING SYSTEM

Sound masking speakers located in outside of offices, should be tapped at 1W, and be calibrated to produce X SPL when measured at 5'10" AFF. Masking speakers located in offices, shall be tapped at ½ W. SPL is determined by calibration of public area sound masking speakers.

#### CHAPEL SYSTEM

'CP' shall be equipped with pulpit Up/Down buttons, Room Volume step up/down buttons, LED's to provide user feedback of relative volume level. Power On/Off button, and power LED. Each time the system is turned on, the system will shall:

- restore the system to its default settings, and,
- illuminate the middle sound level LED, which corresponds to the defaults sound level.
- Trigger the Chapel amplifier relay, wait 3 to 5 seconds, for the amplifier to power up, then unmute the DSP output to the chapel amplifier.
- While the amplifier is powering up, the power LED should flash, indicating that the system is not fully ready.
- After the system is fully ready, the LED should remain on.
- Pulpit Up/Down control
- When the system is activated, the pulpit up/down control shall trigger relays in the pulpit height motor causing it to move up or down within the limits determined by the pulpit manufacturer
- shall not cause an audible pop to be heard over the sound system
- Relays installed by the AV contractor shall not be audible in the vicinity of the pulpit, when being operated.

#### Volume Level Control

The volume level control shall allow the user to control the relative volume level of the room within a 10dB range. Steps up from the default level shall be made in 2dB steps. Steps down from the default level shall be made in 3dB steps. Where the manufactures products do not allow steps of different levels, the increasing, and decreasing steps shall be of equal magnitude. The LEDs on the CP shall each correspond to a step location, and shall illuminate to indicate the selected relative sound level.

In systems where a CS is installed in the chapel, the CS should:

- As closely as possible mirror the KP in the video Rack, both audio levels and selections should be mirrored.
- Control the volume of the selected auxiliary audio feed, without affecting the volume of the microphones, or the auxiliary input on the side of the pulpit.
- The selected audio from the CS should be routed to the CP, to be included with the room mix.
- The CS, should not function unless the CP is already on.
- If a user attempts to active the CS when the CP is off, the system should initiate the startup sequence for the system, then activate the CS.
- When the sound system is turned off, the last selected CS configuration should be retained in memory for 4hrs. After 4hrs, the CS selection should revert to none, and the volume level should be set to ∞.
- No microphones inputs should be muted when an Aux source is selected on the CS

## **Default Configuration**

- The defaults sound level for the system is 4Db below the feedback level.
- The number of open Mies (NOM) shall be 3.
- The pulpit, and sacrament microphones shall be set to always open.
- Auxiliary feeds from both the video system, and the audio system shall not be included in the NOM calculation.

#### **CULTURAL HALL SYSTEM**

The cultural hall system consists of multiple sections. From the available sections, the section closest to the chapel shall be equipped with a 'CC' or main controller, and shall be referred to as the main section. The next largest available section shall be equipped with a 'CC2' or secondary controller, and shall be referred to as the secondary. Each section shall be electronically separated, or combined via an Infrared sensor, which shall be mounted such that it reliably detects weather the operable partition doors physically separating the sections are open or closed.

The Cultural hall 'CC' device shall consist of power and manual control buttons. 3 rotary knobs, along with one each XLR, RCA, and stereo mini input jacks housed in a protective metal wall box. The power button, shall be capable of turning the cultural hall sound system on in all attached sections, and shall default to auto mode. When in auto mode, the sound level in the cultural hall shall be determined by the level determined by the consultant as part of the EO. When in manual mode, volume knobs shall allow users to adjust the volume of individual microphone or line level inputs.

The cultural hall 'CC2' device shall be consist of a 4-button controller with volume control mounted in a protective metal wall box. The 4 buttons shall be labeled from top to bottom as Off and local mic. In meetinghouses, equipped with a satellite system, the reaming buttons shall be labeled with the second and third most common languages used in the meetinghouse. Where no languages are used, the buttons shall be left blank.

#### Room Combining

• Cultural hall sections and the chapel shall be combinable, by opening the folding partition doors, and triggering the IR sensors. Combinable sections are assigned a priority, when a lower priority section is combined with a higher priority section, controls in the lower priority section shall be disabled, and the sound mix from the higher priority section shall be routed to the lower priority section. When controls are disabled, LEDs shall flash, indicating that the controls are not available.

#### ASSISTIVE LISTENING SYSTEM (ALS)

The assistive listening system, uses RF frequencies to broadcast an audio feed to compatible receivers. When the chapel sound system is on, the system broadcasts the chapel sound. If the cultural hall system is on, and the chapel is not, the system will broadcast the sound form the cultural hall.

## INDEPENDENT ROOM SYSTEMS

Rooms with independent systems, are equipped include one or micjacks which, and a wall controller. The wall controller shall be capable of selecting the sound source to be heard over the local sound system. In meetinghouses without a satellite system, the controller shall select between the local feed, and the perimeter feed. In meetinghouse which include a satellite system, the controller shall also be able to select between the available satellite languages. The controller shall list the satellite language name as sat, followed by the language names, such as "Sat English".

The wall controller shall also be equipped with a volume control knob, capable of adjusting the volume between mute, and odB. The odB level shall correspond to the maximum volume level set at EO which does not produce feedback when the local microphone is used.

#### PERIMITER ROOM SYSTEMS, AND THE PERIMITER FEED

The perimeter room systems shall include a speaker and volume control knob, in each meetinghouse foyer area, serving area, as well as other selected rooms. These systems shall be connected to the perimeter feed.

When active, the perimeter feed shall transmit sound to the connected systems and rooms. Connected systems shall include independent room systems, Assistive Listening Systems, and Foyer systems, the perimeter feed shall default to the

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chapel sound whenever the chapel system is on. If the cultural hall system is on, when the chapel system is off, the perimeter feed shall transmit the cultural hall system. When both systems are off, the perimeter feed shall transmit no sound signals.

## WEBCAST AUDIO

Stake Centers shall be equipped with XLR inputs and outputs for the purpose of allowing users to alter the default webcast audio feed. The AV rack shall include connections for 2 Choir microphones, an Organ Output, a Chapel Mix output, and a Webcast Input. The chapel organ sound shall be routed from the chapel organ to the chapel organ output. The sound heard through the overflow speakers in the chapel shall be routed to the Chapel Mix Output. The Choir Microphone outputs shall be cabled directly to the Choir microphone inputs on the rostrum.

The system shall include a webcast output connected directly from the DSP processor to the Webcast device. By Default, the system shall route the Chapel Mix to webcast device. If signal is detected on the Webcast In, the system shall automatically route that signal to the webcast device instead of the default chapel mix. Users shall be able to connect a manual mixer to the provided connections on CP1, and automatically route a custom mix to the webcast device.

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# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

DIVISION 28: ELECTRONIC SAFETY AND SECURITY

28 3000 Detection and Alarm

28 3101 Fire Detection and Alarm System

# SECTION 28 3101 FIRE DETECTION AND ALARM SYSTEM

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install fire alarm and detection system as described in Contract Documents.
  - 2. Furnish and install raceway, cable and conductors, boxes, and miscellaneous items necessary for complete system.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Door Plates for door hold / release devices.
- C. Related Requirements:
  - 1. Section 11 3115: 'Residential Appliances: Fire Suppression Hood' for connection to fire alarm interface.
  - 2. Division 21: Furnishing and installing of water flow switches, post indicating valves, valve tamper switches, and low air pressure switch.
  - 3. Section 23 0933: Furnishing and installing of duct smoke detectors in main return air ducts.
  - 4. Division 26: Quality of and installation standards for wiring, raceway, conduit, and boxes.
- D. Where a fire sprinkler system is to be installed, provide following alarm system functions:
  - 1. Monitor flow switches.
  - 2. Supervise tamper on valves.
  - 3. Monitor low air pressure switch on dry pipe portion of system if present.
  - 4. Provide low temperature sensor in attic near exposed wet piping and monitor on separate supervisory zone.
- E. Provide dialer system equipment for off-site monitoring compatible with Owner selected monitoring service.
- F. If Fire Suppression Hood as specified in Section 11 3115 is included in Project, provide connection to Fire Suppression Hood fire alarm interface.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA 72, 'National Fire Alarm and Signaling Code' (2016 Edition or latest approved version).
  - 2. Underwriters Laboratories:
    - a. UL 268, 'Smoke Detectors for Fire Alarm Systems'.
    - b. UL 464, 'Audible Signal Appliances'.
    - c. UL 521, 'Heat Detectors for Fire Protective Signaling Systems'.
    - d. UL 864, 'Control Units and Accessories for Fire Alarm Systems'.
    - e. UL 1480, 'Speakers for Fire Alarm, Emergency, and Commercial and Professional'.
    - f. UL 1481, 'Power Supplies for Fire-Protective Signaling Systems'.
    - g. UL 1971, 'Standard for Signaling Devices for the Hearing Impaired'.

## 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Prepared by authorized factory representative and including:
      - 1) Single line diagram of actual system. Typical riser diagrams are not acceptable.
      - 2) Complete wiring diagrams.
      - Manufacturer's original catalog data and descriptive information on each piece of equipment to be used.

#### B. Informational Submittals:

- Certificates:
  - a. Certificate of completion, from Manufacturer's Representative, in accordance with NFPA 72 requirements.
- 2. Qualification Statement:
  - a. Installer:
    - 1) Provide NICET Certification documentation.

#### C. Closeout Submittals:

- 1. Include following information in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
    - 2) Provide instruction manual from Manufacturer that explains what is to be done in event of various indications.
  - b. Record Documentation:
    - 1) Include copy of approved shop drawings.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
  - 2. Equipment, devices, and cable shall be UL or Factory Mutual listed for use in fire alarm systems.

#### B. Qualifications:

- 1. Installer:
  - a. Project Forman or Person in Charge at all times to be NICET Level III Certified for work performed by this Section.
  - b. Provide Certificate documentation before installation.

## PART 2 - PRODUCTS

## 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers:
    - a. Bosch Security Systems, Fairport, NY www.boschsecurity.us.
    - b. Fire-Lite Alarms, Northford, CT www.firelite.com.
    - c. EST by Edwards, Bradenton, FL www.edwardsutcfs.com.
    - d. Mircom / Summit Systems Technologies, Cheektowaga (Buffalo), NY, Vaughan (Toronto), Ontario www.mircom.com / www.summit-st.net.
    - e. Potter Electric Signal Company, St. Louis, MO www.pottersignal.com.
    - f. Silent Knight Security Systems, Northford CT www.silentknight.com.
    - g. Equal as approved by Architect before bidding. See Section 01 6200.

## B. Performance:

- 1. Design Criteria:
  - a. Automatic fire alarm system consisting of control panel, power supplies, alarm initiating devices, notification appliances, and off-site communicating devices. System shall be non-coded and addressable, and monitored for integrity of conductors.
  - b. Class A loop type initiating device circuits and Class A loop type notification appliance circuits.
  - c. Equipment and accessories furnished under this Specification shall be standard products of single manufacturer, or include written statement by Control Panel Manufacturer confirming compatibility of components and inclusion of these components under system warranty.

## C. Operation:

- 1. Operation Sequences:
  - a. Operation of manual station or automatic activation of any smoke detector, heat detector, or sprinkler flow device shall:

- 1) Cause system notification appliances to operate.
- 2) Indicate zone in alarm on control panel.
- 3) Initiate off-site alarm notification system.
- b. System shall return to normal when operated device is returned to normal and control panel is manually reset, except alarms may be silenced as specified below.
- c. Alarm may be silenced by switch in control panel.
  - 1) Ring Back Feature: When silenced, this shall not prevent the resounding of subsequent alarms if another zone should alarm.
- d. When alarms are silenced, zone indicating red LEDs on control panel and remote annunciator shall remain indicated until operated device is returned to normal and control panel is manually reset.
- Green pilot LED, or other visual annunciation, shall normally be on indicating that system is receiving normal power. In addition, failure of normal power shall be annunciated.
- f. Trouble alarm and annunciation, operating together, shall signal trouble condition. Following conditions shall signal trouble condition:
  - 1) Failure of normal power.
  - 2) Opens or short circuits on indicating circuits.
  - 3) Disarrangements in system wiring.
  - 4) Control panel circuit board removal.
  - 5) Ground faults.
  - 6) Trouble silencing switch shall silence trouble alarm, but visual annunciation shall remain on until system is restored to normal. As ring-back feature, trouble alarm shall resound as reminder to return silencing switch to normal position.
- g. Supervisory LED, separate from trouble LED, and alarm, operating together, shall signal operation of supervisory device, such as control valve tamper, low air pressure, and low temperature switches. Alarm silence switch shall operate in same manner as trouble alarm.

#### D. Components:

- Control Panel:
  - a. Listed under UL Standard 864.
  - b. Solid-state design with flush or semi-flush mounting.
  - c. Control functions shall be behind locked door with annunciating devices visible through door. Single key shall operate all keyed functions in system. Provide three keys.
  - d. Each zone shall be electrically supervised in accordance with wiring style specified.
  - e. Provide integral surge protection.
  - f. Make provisions for connection to off-site alarm notification system including all required programming. Provide separate dry contacts for alarm and supervisory/trouble alarms.
  - g. Power Supply:
    - 1) Provide indication of normal power supply.
    - 2) Loss of normal power shall activate trouble alarm.
    - 3) Meet requirements of and size in accordance with UL Standard 1481 and NFPA 72.
    - 4) Include standby batteries, charger, and automatic transfer equipment.
  - h. Visual Annunciation:
    - 1) Separate indication on each zone for alarm, trouble, or supervisory conditions.
    - 2) Visual indication shall be by LED lights or other easily identifiable method.
    - 3) On zoned system, permanently custom label zones by zone name, not number.
    - 4) Fault or trouble condition on any zone shall not affect any other zone.
  - i. Audible Horn Alarm Annunciation:
    - 1) Provide separate and distinct alarm signals for alarm and trouble conditions.
    - 2) Alarm signal shall also operate strobe lights, if specified.
    - 3) Provide alarm silence switches at control panel.
    - 4) Trouble alarm shall be horn integral to control panel.
    - 5) Supervisory alarm may be same audible alarm as trouble alarm, but with separate visual annunciation.
- 2. Off-Site Alarm Notification System
  - a. Provide two (2) telephone lines to fire alarm control panel.
  - b. Provide dialer system equipment and programming compatible with Owner selected monitoring service.
  - c. Owner will arrange for monitoring connection contract.
  - d. Communicator device shall transmit all zone identification, device identification alarm identification, and all other signals available at panel to Owner's Central Station using standard contact ID codes.
  - e. Communicator device shall be of same manufacturer as Fire Alarm Panel or shall be supplied, approved and tested by Fire Alarm Panel Manufacturer.
- 3. Alarm Initiating Devices:
  - a. Smoke Detectors:

- 1) Photoelectric type.
- 2) Listed under UL Standard 268.
- 3) Provide visual indication of alarm on unit.
- b. Duct Smoke Detectors:
  - 1) Furnished and Installed by Division 23.
  - 2) Power provided by Division 26.
  - 3) Connect to Fire Detection And Alarm System by this Section.
- c. Heat Detectors:
  - 1) Non-settable 135 deg F fixed temperature.
  - 2) Provide visible indication that device has operated.
  - 3) Listed under UL Standard 521.
- d. Low Building Temperature Device:
  - 1) Set for contact closure at 35 deg F.
  - Type Two Acceptable Products;
    - a) Honeywell T631A1006.
    - Equal as approved by Architect before installation. See Section 01 6200.
- e. Manual Fire Alarm Boxes:
  - Non-coded and double-action requiring two actions to initiate alarm. Breakable glass type is not approved.
  - Box shall mechanically latch when actuated and require key to reset. Key shall match control panel door lock.
  - 3) Provide STI-1200 clear polycarbonate covers.
- 4. Notification Appliances:
  - a. Color: White.
  - b. Combination Horn / Strobe:
    - 1) Wall mounted flush or semi-flush.
    - 2) Non-coded audible output of 90 dB minimum at 10 feet.
    - 3) Integrally mounted flashing light unit with block letters 'FIRE.' Minimum light intensity of 15 candela and flash rate between one and three Hertz.
    - 4) Listed under UL Standard 464 and UL Standard 1971.
- 5. Accessory Devices:
  - Notification Appliance Protective Devices: Provide wire guard covers for appliances installed in Cultural Center.
- 6. Cables And Wiring:
  - a. Comply with NEC Article 760.
  - b. Jacket and insulation color shall be red.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install fire alarm and detection systems as indicated, in accordance with Equipment Manufacturer's written instructions, and complying with applicable portions of NEC, NFPA, and NECA's 'Standard of Installation'.
  - 1. Mounting Heights:
    - a. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
      - 1) Control Panel: 72 inches to top.
      - 2) Wall-Mounted Horn / Strobe: 80 inches. 6 inches below ceiling, whenever ceiling is below 80 inches.
      - 3) Wall-Mounted Strobe: 80 inches. 6 inches below ceiling, whenever ceiling is below 80 inches.
      - 4) Manual pull stations: 48 inches.
      - 5) Remote annunciator panel: 60 inches.
  - 2. Locate fire alarm manual stations 24 inches minimum away from any light switch.

#### B. Identification:

- 1. Label zone indicators on control unit indicating location and type of initiating device, i.e., CORRIDOR SMOKE, VALVE TAMPER, AIR SYSTEM SMOKE, etc. Labels shall be engraved plastic laminate, or other permanent labeling system as supplied by Control Unit Manufacturer.
- 2. Post copy of wire identification list inside fire alarm panel door or other area accessible to fire alarm service personnel.
- 3. Print location of circuit disconnecting means inside panel.
- C. Conductors:

- 1. Install conductors in conduit per NEC requirements.
- 2. Fire alarm system conductors from different zones may be combined in common conduit. Make certain that raceway size and wire quantity, size, and type is suitable for equipment supplied and is within NEC standards. Label pull and junction boxes 'FIRE ALARM.'
- 3. Install conductors and make connections to water flow switches, valve tamper switches, low air pressure switches, and duct smoke detectors.
- 4. Loop wires through each device on zone for proper supervision. Tee-taps not permitted.
- 5. Minimum conductor size shall be 14 AWG unless otherwise specified.
- D. Do not install ceiling mounted detectors within 36 inches of air discharge grilles. Do not install manual fire alarm boxes within 24 inches of light switches. Coordinate with other trades as required.

## 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Provide factory-trained representative to perform complete system testing in presence of Owner's representative and local fire department personnel upon completion of installation.
    - a. Test each initiating and annunciating device for proper operation, except fixed temperature heat detectors.
    - b. Test operation of trouble annunciation on each circuit.
    - c. Perform complete testing of control panel functions including off-site monitoring.

## 3.3 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  - 1. Instruct Owner's Representative in proper operation and maintenance procedures.

## 3.4 PROTECTION

- A. Provide dust protection for installed smoke detectors until finish work is completed and building is ready for occupancy.
- B. Protect conductors from cuts, abrasion and other damage during construction.

**END OF SECTION** 



# NIBLEY 12 & MENDON UTAH STAKE CENTER

DIVISION 31:	EARTHWORK:
31 0000	Earthwork
31 0501	Common Earthwork Requirements
31 1000	Site Clearing
31 1100	Clearing and Grubbing
31 1123	Aggregate Base
31 1413	Topsoil Stripping and Stockpiling
31 2000	Earth Moving
31 2213	Rough Grading
31 2216	Fine Grading
31 2316	Excavation
31 2323	Fill
31 3000	Earthwork Methods
31 3116	Termite Control

DIVISION 31 EARTHWORK

# SECTION 31 0501 COMMON EARTHWORK REQUIREMENTS

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited to:
  - 1. General procedures and requirements for earthwork.
- B. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
  - 2. Pre-Installation conferences held jointly with Section 31 0501 as described in Administrative Requirements on Part 1 of this specification section:
  - 3. Section 32 9001: 'Common Planting Requirements':
    - a. Pre-installation conference held jointly with other landscape related sections.

#### 1.2 REFERENCES

#### A. Definitions:

- 1. Aggregate Base: Layer of granular material immediately below concrete and asphalt paving or miscellaneous site concrete (sidewalks, curbs, etc) and below interior concrete slabs on grade.
- 2. Base: See aggregate base.
- 3. Building Grading: sloping of grounds immediately adjacent to building. Proper grading causes water to flow away from a structure. Grading can be accomplished either with machinery or by hand.
- 4. Compacted Fill: Placement of soils on building site placed and compacted per Contract Documents. Used to replace soils removed during excavation or to fill in low spot on building site.
- 5. Excavation: Removal of soil from project site or cavity formed by cutting, digging or scooping on project site.
- 6. Fine Grading (FG): Preparation of subgrade preceding placement of surfacing materials (aggregate base, asphalt or concrete paving, and topsoil) for contour of building site required. Fine Grading is conducted to ensure that earth forms and surfaces have been properly shaped and subgrade has been brought to correct elevations. It is performed after rough grading and placement of compacted fill but before placement of aggregate base or topsoil.
- 7. Finish Grading: Completed surface elevation of landscaping areas for seeding, sodding, and planting on building site.
- 8. Natural Grade: Undisturbed natural surface of ground.
- 9. Rough Grading (RG): Grading, leveling, moving, removal and placement of existing or imported soil to its generally required location and elevation. Cut and fill is part of rough grading.
- 10. Subgrade (definition varies depending upon stage of construction and context of work being performed):
  - a. Prepared natural soils on which fill, aggregate base, or topsoil is placed.
    - Prepared soils immediately beneath paying or topsoil.
- 11. Topsoil Placement and Grading: Topsoil placement and finish grading work required to prepare site for installation of landscaping.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference for common earthwork sections:
    - a. Schedule conference after completion of site clearing but before beginning grading work.
    - b. Participate in pre-installation conference held jointly with following sections:
      - 1) Section 03 3111: 'Cast-In-Place Structural Concrete'.
      - 2) Section 31 1100: 'Clearing and Grubbing'.
      - 3) Section 31 1123: 'Aggregate Base'.
      - 4) Section 31 1413: 'Topsoil Stripping and Stockpiling'.
      - 5) Section 31 2213: 'Rough Grading'.
      - 6) Section 31 2216: 'Fine Grading'.

- 7) Section 31 2316: 'Excavation'.
- 8) Section 31 2323: 'Fill'.
- 9) Section 32 1216: 'Asphalt Paving'.
- 10) Section 33 3313: 'Sanitary Utility Sewerage'.
- In addition to agenda items specified in Section 01 3100, review following:
  - Review Geotechnical Evaluation Report.
  - Review common earthwork schedule. 2)
  - 3) Review protection requirements.
  - 4) Review cleaning requirements.
  - 5) Review safety issues.
  - Review field tests and inspections requirements.
- In addition to agenda items specified above, review following. These are items that will occur before preinstallation conference for landscape sections:
  - Review clearing and grubbing requirements.
  - Review topsoil stripping and stockpiling requirements.
  - 3) Review landscape grading requirements.
  - 4) Review landscape finish grade tolerance requirements.
  - 5) Review landscape and plant tolerances.
  - 6) Review surface preparation of landscape and planting areas.
  - Review additional agenda items as specified in related sections listed above.
- Participate in pre-installation conference for landscape sections as specified in Section 32 9001:
  - Schedule pre-installation conference after completion of Fine Grading specified in Section 31 2216, but one (1) week minimum before beginning landscape work and held jointly with following sections:
    - Section 32 8423: 'Underground Sprinklers'.
    - Section 32 9120: 'Topsoil And Placement'.
    - Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report). 3)
    - Section 32 9122: 'Topsoil Grading'. Section 32 9223: 'Sodding'. 4)
    - 5)
    - Section 32 9300: 'Plants'.
  - In addition to agenda items specified in Section 01 3100 and Section 32 9001, review following that these items have been installed correctly:
    - Review topsoil placement requirements.
    - Review topsoil surface preparation requirements.
    - Review topsoil depth requirements.
    - 4) Review landscape finish grade tolerance requirements.
    - Review surface preparation of landscape and planting areas.

## Sequencing:

- General Earthwork:
  - Excavation. a.
  - Rough Grading. b.
  - Fill. C.
  - d. Fine Grading.
  - Aggregate Base or Topsoil Grading.

#### 1.4 **QUALITY ASSURANCE**

- Testing And Inspection:
  - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - Owner will employ testing agencies to perform testing and inspection as specified in Field Quality Control in Part 3 of this specification:
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - See Section 01 1200: 'Multiple Contract Summary'. 2)

#### PART 2 - PRODUCTS: Not Used

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

#### A. Verification Of Conditions:

- 1. Forty-eight (48) hours minimum before performing any work on site, contact Bluestakes (Underground Service Alert) to arrange for utility location services.
- 2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
- 3. Perform investigative excavating ten (10) days minimum in advance of performing any excavation or underground work.
- 4. Upon discovery of conflicts or problems, notify Architect by phone or fax within twenty-four (24) hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

#### 3.2 PREPARATION

#### A. Protection:

- 1. Spillage:
  - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
  - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
- Dust Control:
  - Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
  - b. Correct or repair damage caused by dust.

## 3.3 REPAIR / RESTORATION

- A. Adjust existing covers, boxes, and vaults to grade.
- B. Replace broken or damaged covers, boxes, and vaults.
- C. Independently confirm size, location, and number of covers, boxes, and vaults that require adjustment.

## 3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - Quality Control is sole responsibility of Contractor. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform The Work or Contractors own Testing and Inspection services.
  - 2. Testing and inspection of earthwork operations is required.
  - 3. Field Tests and Laboratory Tests:
    - a. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils that have been exposed to adverse weather conditions.
  - 4. Field Inspections:
    - a. Notify Architect forty-eight (48) hours before performing excavation or fill work.
    - b. If weather, scheduling, or any other circumstance has interrupted work, notify Architect twenty-four (24) hours minimum before intended resumption of grading or compacting.

- B. Non-Conforming Work:
  - 1. If specified protection precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

END OF SECTION

# SECTION 31 1100 CLEARING AND GRUBBING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Perform clearing and grubbing as necessary to prepare site for rough grading and structure excavation as
    described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 0501: Common Earthwork Requirements:
    - a. General procedures and requirements for earthwork.
    - b. Pre-installation conference held jointly with other common earthwork related sections.
    - c. Pre-installation conference held jointly with other landscape related sections.

## 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conferences as specified in Section 31 0501.

PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

# 3.1 PERFORMANCE

- A. Tree And Brush Removal:
  - 1. Cut off trees, shrubs, brush, and vegetative growth 12 inches maximum above ground.
- B. Grubbing:
  - 1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows:
    - a. Under buildings, remove roots one inch and larger entirely.
    - b. Entirely remove roots of plants that normally sprout from roots, as identified by Architect.

## 3.2 CLEANING

- A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.
- B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

# END OF SECTION

# SECTION 31 1123 AGGREGATE BASE

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install the following as described in Contract Documents:
    - a. Aggregate Base:
      - 1) Interior concrete slabs-on-grade.
      - 2) Miscellaneous exterior concrete (sidewalks, curb, gutter and equipment pads).
      - 3) Asphalt paving.
- B. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
  - 2.
  - 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 4.
  - 5. Section 03 3111: 'Cast-In-Place Structural Concrete'.
  - 6. Section 31 0501: 'Common Earthwork Requirements':
    - a. General procedures and requirements for earthwork.
    - b. Pre-installation conference held jointly with other common earthwork related sections.
  - 7. Section 31 2213: 'Rough Grading'.
  - 8. Section 31 2216: 'Fine Grading' for subgrade procedures.
  - 9. Section 31 2323: 'Fill' for compaction procedures and tolerances.
  - 10. Section 31 3116: 'Termite Control'.
  - 11. Section 32 1216: 'Asphalt Paving.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Vapor Retarder:
    - a. Interior slabs on grade:
      - 1) Under-slab vapor retarder and seam tape.
- D. Related Requirements:
  - 1. Section 07 2616: 'Below-Grade Vapor Retarders' for:
    - a. Furnishing of vapor retarder and seam tape.

## 1.2 REFERENCES

- A. Definitions:
  - 1. Aggregate (Asphalt Paving):
    - a. Aggregate: A hard inert mineral material, such as gravel, crushed rock, slag, or sand.
    - b. Coarse Aggregate: Aggregate retained on No. 8 (2.36 mm) sieve.
    - c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.
    - d. Fine Aggregate: Aggregate passing No. 8 (2.36 mm) sieve.
    - e. Reclaimed Asphalt Pavement (RAP): Existing asphalt mixture that has been pulverized, usually by milling, and is used like an aggregate in recycling of asphalt pavements.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
    - b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.

AGGREGATE BASE - 1 - 31 1123

- c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))'.
- d. ASTM D1883-16, 'Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.
- e. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
- f. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
- g. ASTM D4318-10, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
- h. ASTM D6938-17, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
- i. ASTM E1643-11(2017), 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Pre-Installation Conferences:

- 1. Participate in MANADORY pre-installation conference as specified in Section 31 0501.
- 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
  - a. Review requirements and frequency of testing and inspections.
  - b. Review termite control application requirements.
  - c. Review aggregate base installation requirements.
  - d. Review vapor retarder installation requirements.
  - e. Review proposed miscellaneous exterior concrete schedule.
  - f. Review proposed asphalt paving schedule.
  - g. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
    - 1) Review frequency of testing and inspections.

#### B. Sequencing:

- 1. Compaction as described in Section 31 2216 'Fine Grading'.
- Termite Control:
  - a. Termite application as described in Section 31 3116 'Termite Control':
    - 1) Application OPTION A:
      - a) Apply termite protection on top of soil base before aggregate base and vapor retarder is installed.
    - 2) Application OPTION B:
      - Install vapor retarder after application of termite protection on top of aggregate base.
- 3. Exterior Footings and Foundations are installed.
- 4. Vapor Retarder below interior concrete slabs on grade:
  - a. Install below-grade vapor retarder on top of aggregate base.
- 5. Aggregate Base:
  - a. Install aggregate base at location shown in Contract Drawings.
- Concrete Slab is installed.

#### C. Scheduling:

- 1. Interior slab-on-grade concrete:
  - a. Notify Architect twenty-four (24) hours minimum before installation of concrete to allow inspection of vapor retarder installation.
  - b. Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of interior concrete slabs to allow inspection of aggregate base.
  - c. Allow special inspector to review all sub grades and excavations to determine if building pad has been prepared in accordance with geotechnical report prior to placing any aggregate base.
- 2. Miscellaneous exterior concrete:
  - a. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters, etc.), footings, foundation walls, and building slabs to allow inspection of aggregate base.
- 3. Asphalt Paving:
  - Notify Testing Agency and Architect twenty-four (24) hours minimum before placing aggregate base to allow inspection of aggregate base.

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#### 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports of aggregate base.

## 1.5 QUALITY ASSURANCE

- A. Testing And Inspection:
  - 1. Owner will provide Testing and Inspection for aggregate base:
    - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - b. Owner will employ testing agencies to perform testing and inspection for aggregate base as specified in Field Quality Control in Part 3 of this specification.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.

## 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not perform work during unfavorable conditions as specified below:
    - a. Aggregate Base:
      - 1) Presence of free surface water.
      - 2) Over-saturated sub base materials.
    - b. Vapor Retarder:
      - Unacceptable conditions for installation include presence of high winds which would tear or damage vapor retarder.

## PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Aggregate Base:
  - 1. Under Interior Slab-On-Grade Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
    - a. New Aggregate Base:
      - 1) Gravel: 3/4 inch minimum to one inch maximum well-graded, clean gravel or crushed rock.
      - Base type gravel or crushed rock, graded by weight as follows (three-quarter to one-inch clean gapgraded gravel):
        - a) Road Base type gravel or crushed stone (slag not allowed), graded as follows:

(1)	Siev	е	Percent of Weight Passing		
	(a)	1 inch	100		
	(b)	3/4 inch	90 - 80		
	(c)	1/2 inch	20 - 40		
	(d)	3/8 inch	5 - 10		
	(۵)	No 4	0 - 12		

- 2. Under Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
  - a. New Aggregate Base:
    - 1) Road Base to conform to State DOT Specifications.

- 3. Under Asphalt Paving (Section 32 1216 'Asphalt Paving'):
  - a. New Aggregate Base:
    - 1) Road Base to conform to 1-1/2 inches minus State DOT Specifications and Gradations.
    - Aggregate base shall be non plastic.

## PART 3 - EXECUTION

## 3.1 PREPARATION

#### A. Stockpiles:

- 1. Provide area for each stockpile of adequate size, reasonably uniform in cross-section, well drained, and cleared of foreign materials.
- 2. Locate piles so that there is no contamination by foreign material and no intermingling of aggregates from adjacent piles. Do not use steel-tracked equipment on stockpiles.
- 3. Do not store aggregates from different sources, geological classifications, or of different gradings in stockpiles near each other unless bulkhead is placed between different materials.
- 4. Do not use washed aggregates sooner than twenty-four (24) hours after washing or until surplus water has drained out and material has uniform moisture content.
- 5. Do not stockpile higher than 15 feet (4.57 m). Cover or otherwise protect stockpiles for use in HMA to prevent buildup of moisture.
- B. Surface Preparation (Miscellaneous Exterior Concrete):
  - 1. Subgrade:
    - a. Finish grade to grades required by Contract Documents.
    - b. Compact subgrade as specified in Section 31 2323.
- C. Surface Preparation (Asphalt Paving):
  - 1. Subgrade:
    - a. Finish grade parking surface area to grades required by Contract Documents.
    - b. Aggregate base and paving must be placed before any moisture or seasonal changes occur to subgrade that would cause compaction tests previously performed to be erroneous. Recompact and retest subgrade soils that have been left exposed to weather.
- D. Surface Preparation (Interior Slab-On-Grade Concrete):
  - 1. Vapor Retarder:
    - Install vapor retarder in accordance with ASTM E1643 except where Contract Documents indicate otherwise and following instructions:
      - Install vapor retarder over aggregate base over compacted subgrade so entire area under slab is covered.
      - 2) Install vapor retarder in accordance with ASTM E1643 at interior stem walls.
      - 3) Lap joints 6 inches minimum and seal with specified seam tape.
      - 4) Seal vapor retarder around pipes, conduits, and other utility items that penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
      - 5) Except for punctures required for reinforcing and anchor bolts at top of stem walls, seal tears and punctures.

## 3.2 INSTALLATION

#### A. Aggregate Base:

- General:
  - a. Do not place aggregate base material when subgrade is frozen or unstable.
  - Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
  - c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
  - d. Correct damage to aggregate base caused by construction activities, and maintain corrected aggregate base until subsequent course is placed.
  - e. Do not allow traffic on aggregate base.
  - f. Remove all standing storm water.

AGGREGATE BASE - 4 - 31 1123

- 2. Under interior concrete slab-on-grade aggregate base:
  - Place 4 inches minimum of aggregate base under vapor retarder, level, and compact with vibratory plate compactor.
- 3. Under miscellaneous exterior concrete aggregate base:
  - a. Except under mow strips, place 4 inches minimum of aggregate base, level, and compact as specified in Section 31 2323.
- 4. Asphalt paving aggregate base:
  - a. 6 inch thick minimum after compaction in accordance with Contract Drawings.
  - b. If roller is smaller than 8 ton, lay aggregate base and compact in two courses.
  - c. Compact as specified in Section 31 2323.
  - d. Priming: Prime aggregate base with application of 0.2 to 0.5 gallons of asphalt cement primer per square yard if pavement will be laid more than three days after compaction of aggregate base, or if precipitation is anticipated between completion of compaction of aggregate base and laying of asphalt paving.
  - e. Recompact unprimed aggregate base if it receives precipitation before pavement is laid.
  - f. Remove or repair improperly prepared areas as directed by Architect.

#### Tolerances:

- 1. Asphalt Paving Areas:
  - a. Aggregate base:
    - 1) 0.00 inches high.
    - 2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
    - 3) Finished base course shall be true to line and grade within plus or minus 1/4 inch in 10 feet.
    - 4) Maximum variation from required grades shall be 1/10 of one foot.

## 3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - Aggregate Base:
    - a. Interior slab-on-grade concrete areas:
      - 1) Testing Agency shall provide testing and inspection for interior aggregate base.
      - 2) Number of tests may vary at discretion of Architect.
      - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
        - a) Building Slab Areas: One test for every 2,500 sq. ft. or less of building slab area but no fewer than three tests.
    - b. Miscellaneous exterior concrete areas:
      - 1) Testing Agency shall provide testing and inspection for exterior aggregate base.
      - 2) Number of tests may vary at discretion of Architect.
      - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
        - a) Sitework Areas: One test for every 10,000 sq. ft. or less of exterior pads area but no fewer than three tests.
    - c. Asphalt paving area:
      - 1) Testing Agency shall provide testing and inspection for exterior aggregate base.
      - 2) Number of tests may vary at discretion of Architect.
      - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
      - 4) Sitework Areas: One test for every 10,000 sq. ft. or less of exterior pads area but no fewer than three tests.

## 3.4 PROTECTION

- A. Interior Slab-On-Grade Concrete:
  - 1. Vapor Retarder:

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- Do not allow water onto vapor retarder or aggregate base before placing concrete. Protect membrane from possible punctures caused by reinforcing bar supports before placing concrete. b.

# END OF SECTION

AGGREGATE BASE - 6 -31 1123

# SECTION 31 1413 TOPSOIL STRIPPING AND STOCKPILING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Strip and stockpile acceptable topsoil as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 0501: 'Common Earthwork Requirements':
    - a. General procedures and requirements for earthwork.
    - b. Pre-installation conference held jointly with other common earthwork related sections.
    - c. Pre-installation conference held jointly with other landscape related sections.
  - 2. Section 31 1100: 'Clearing and Grubbing'.
  - 3. Section 31 2213: 'Rough Grading'.
  - 4. Section 31 2316: 'Excavation'.
  - 5. Section 32 9001: 'Common Planting Requirements'.
  - 6. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
  - 7. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on Topsoil Testing Report).
  - 8. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.

## 1.2 REFERENCES

- A. Definitions:
  - 1. Existing topsoil: Defined as total amount of soil stripped and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraphs below.

## 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conferences as specified in Section 31 0501.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

## 3.1 PERFORMANCE

A. Strip existing vegetation layer 1 1/2 inches deep minimum from areas of site to receive buildings, landscaping, and paving and remove from site before stripping topsoil for storage and reuse.

- B. After stripping vegetation layer, strip existing topsoil additional 10 to 11 inches deep minimum from areas of site to receive buildings and paving and store on site for later use.
  - 1. Existing topsoil is property of Contractor with restriction that topsoil is to be used first for Project landscape topsoil requirements and second for non-structural fill and backfill.
  - 2. After Project fill, backfill, and landscape topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Architect's written approval.
- C. Screen existing topsoil to meet standards established as specified in Section 32 9120 'Topsoil And Placement'.

END OF SECTION

# SECTION 31 2213 ROUGH GRADING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
  - 2. Section 03 3053: Miscellaneous Exterior Cast-In-Place Concrete.
  - 3. Section 31 0501: 'Common Earthwork Requirements' for:
    - a. General procedures and requirements for earthwork.
    - p. Pre-installation conference held jointly with other common earthwork related sections.
  - 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
  - 5. Section 31 1413: 'Topsoil Stripping And Stockpiling' for stripping and storing of existing topsoil.
  - 6. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
  - 7. Section 31 2316: 'Excavation'.
  - 8. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
  - 9. Section 32 1216: 'Asphalt Paving'.
  - 10. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.

## 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501:
  - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
    - a. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
    - b. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

## PART 2 - PRODUCTS

#### 2.1 MATERIALS

A. Materials used for fill shall be as specified for backfill in Section 31 2323 'Fill'.

## PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Verify elevations of rough grading are correct before compacted fill, fine grading, aggregate base or landscape grading are placed.

#### 3.2 PREPARATION

A. Surface Preparation:

 Before making cuts, remove topsoil over areas to be cut and filled that were not previously removed by stripping specified in Section 31 1413 'Topsoil Stripping And Stockpiling'. Stockpile this additional topsoil with previously stripped topsoil.

# 3.3 PERFORMANCE

- A. Subgrade (Natural Soils):
  - Subgrade beneath compacted fill or aggregate base under asphalt or concrete paving shall be constructed smooth and even.
- B. Special Techniques:
  - 1. Compact fills as specified in Section 31 2323 'Fill'.
  - 2. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.
- C. Tolerances:
  - 1. Maximum variation from required grades shall be 1/10 of one foot.

END OF SECTION

ROUGH GRADING - 2 - 31 2213

# SECTION 31 2216 FINE GRADING

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform fine grading of subgrade work required to prepare site for paving finish grading and for placement of topsoil as described in Contract Documents.
  - 2. Asphalt Paving:
    - a. Prepare natural soil subgrade as described in Section 31 2213 'Rough Grading' or prepare fill subgrade as described in this specification section for asphalt paving.

#### B. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
- 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 3. Section 31 0501: 'Common Earthwork Requirements' for:
  - a. General procedures and requirements for earthwork.
  - b. Pre-installation conference held jointly with other common earthwork related sections.
- 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
- Section 31 1413: 'Topsoil Stripping And Stockpilling' for stripping and storing of existing topsoil.
- 6. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
- 7. Section 31 2316: 'Excavation'.
- 8. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
- 9. Section 32 1216: 'Asphalt Paving' for finish grading for asphalt paving.
- 10. Section 32 9001: 'Common Planting Requirements'.
  - a. Pre-installation conference held jointly with other common planting related sections.
- 11. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
- 12. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on Topsoil Testing Report).
- 13. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.

## 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 31 0501 and Section 32 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
    - a. Review backfill requirements.
    - b. Review geotechnical report.
    - c. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
      - 1) Review requirements and frequency of testing and inspections.

## B. Scheduling:

- Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of fill / engineered fill to allow inspection.
- 2. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical report prior to placing any fill, aggregate base or concrete.
- 3. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

#### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports of fill / engineered fill.

## 1.4 QUALITY ASSURANCE

- A. Testing And Inspection:
  - Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - 2. Owner will provide Testing and Inspection for fill / engineering fill:
    - a. Owner will employ testing agencies to perform testing and inspection for fill / engineering fill as specified in Field Quality Control in Part 3 of this specification.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.

#### PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Protection Of In-Place Conditions: Protect utilities and site elements from damage.
- B. Surface Preparation:
  - Landscaping and Planting Areas:
    - a. Before grading, dig out weeds from planting areas by their roots and remove from site. Remove rocks larger than 1-1/2 inches (38 mm) in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
    - b. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
  - 2. Asphalt Paving:
    - a. Survey and stake parking surfaces to show grading required by Contract Documents.
    - b. Subgrade (material immediately below aggregate base):
      - 1) Compact subgrade as specified in Section 31 2213 (natural soils) and Section 31 2323 (fill).
      - 2) Fine grade parking surface area to grades required by Contract Documents.
      - 3) Subgrade to be constructed smooth and even.

## 3.2 PERFORMANCE

- A. Interface With Other Work: Do not commence work of this Section until grading tolerances specified in Section 31 2213 are met.
- B. Tolerances:
  - Site Tolerances:
    - a. Subgrade (material immediately below aggregate base):
      - 1) 0.00 inches high.
      - 2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
      - Maximum variation from required grades shall be 1/10 of one foot.
  - 2. Aggregate Base (Asphalt Paving) Tolerances:
    - a. Aggregate base shall be 6 inches thick minimum after compaction.
    - b. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.

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- 3. Landscaping and Planting Tolerances:
  - a. Maximum variation from required grades shall be 1/10 of one foot.
  - b. To allow for final finish grades as specified in Section 32 9121 of planting areas, fine grade elevations before placing topsoil and mulch are:
    - 1) Sod Areas: 7 inches below top of walk or curb.
    - 2) Ground Cover Areas: 7 inches below top of walk or curb.
    - 3) Tree And Shrub Areas: 4 inches below top of walk or curb.
- 4. Slope grade away from building as specified in Section 32 9120.

#### 3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor:
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - 2. Site Preparation:
    - a. Prior to placement of fill / engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
    - b. Footing subgrade: At footing subgrades, Certified Inspector is to verify that soils conform to geotechnical report.
  - 3. Fill / Engineered Fill:
    - a. Testing Agency shall provide testing and inspection for fine grading.
    - b. Number of tests may vary at discretion of Architect.
    - Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill
      material.

**END OF SECTION** 

FINE GRADING - 3 - 31 2216

# SECTION 31 2316 EXCAVATION

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform Project excavating and trenching as described in Contract Documents, except as specified below.
  - Procedure and quality for excavating and trenching performed on Project under other Sections unless specifically specified otherwise.
- B. Related Requirements:
  - 1. Section 31 0501: 'Common Earthwork Requirements' for:
    - a. General procedures and requirements for earthwork.
    - p. Pre-installation conference held jointly with other common earthwork related sections.
  - 2. Section 31 1100: Clearing and Grubbing.
  - 3. Section 31 1123: 'Aggregate Base'.
  - 4. Section 31 1413: 'Topsoil Stripping and Stockpiling'.
  - 5. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
  - 6. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
  - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
  - 8. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

# 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501:
  - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
    - a. Review protection of existing utilities requirements.

PART 2 - PRODUCTS: Not Used

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Carefully examine site and available information to determine type soil to be encountered.
  - 2. Discuss problems with Architect before proceeding with work.

# 3.2 PREPARATION

- A. Protection of Existing Utilities:
  - 1. Protect existing utilities identified in Contract Documents during excavation.
  - 2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

EXCAVATION - 1 - 31 2316

#### 3.3 PERFORMANCE

- A. Interface With Other Work:
  - 1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
  - 2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.

#### B. Excavation:

- 1. Building Footings And Foundations:
  - a. Under Building:
    - Remove surface vegetation, non-engineered fill, topsoil, other deleterious materials, and loose/disturbed soils from beneath an area extending out at least 5 feet beyond perimeter buildings and structures and as necessary for proper placement and forming of footings and foundations.
  - b. Bottom of excavations to receive footings shall be 12 inches minimum of compacted engineered fill extending down to the native soils.
  - c. Excavation Carried Deeper Than Required:
    - 1) Under Footings: Fill with compacted engineered fill.
      - a) The width of engineered replacement fill shall extend past the edge of the footing a minimum of 1-foot plus one foot horizontally for each foot of vertical fill thickness.
    - 2) Under Slabs: Use compacted engineered fill.
- 2. Pavement And Miscellaneous Cast-In-Place Concrete:
  - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation, non-engineered fill, topsoil, loose/disturbed soils, and deleterious material and remove from site.
  - b. Backfill over-excavated areas with compacted sub-base material specified in Section 31 2323.
  - c. After excavation to the proper subgrade elevation, proof-roll the exposed subgrade with a loaded tandem axle dump truck or similar rubber-tired vehicle. Remove and replace exposed soils that rut, deflect excessively or become soft or unstable.
- 3. Utility Trenches:
  - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
  - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
  - c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
  - d. Pipe 4 Inches In Diameter Or Larger:
    - Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
    - 2) Except where rock is encountered, take care not to excavate below depths indicated.
      - a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
      - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
    - Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
- 4. If unusual excavating conditions are encountered, stop work and notify Architect.

# 3.4 REPAIR / RESTORATION

A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

## 3.5 CLEANING

A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

# END OF SECTION

EXCAVATION - 2 - 31 2316

# SECTION 31 2323 FILL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform Project backfilling and compacting as described in Contract Documents, except as specified below.
  - Procedure and quality for backfilling and compacting performed on Project under other Sections unless specifically specified otherwise.

#### B. Related Requirements:

- 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
- Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 3. Section 31 0501: 'Common Earthwork Requirements' for:
  - a. General procedures and requirements for earthwork.
  - b. Pre-installation conference held jointly with other common earthwork related sections.
- 4. Section 31 1100: 'Clearing and Grubbing'.
- 5. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
- 6. Section 31 1413: 'Topsoil Stripping And Stockpiling' for stripping and storing of existing topsoil.
- 7. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
- 8. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- 9. Section 31 2316: 'Excavation'.
- 10. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
- 11. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on Topsoil Testing Report).
- 12. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.
- 13. Division 32: Compaction of subgrade under walks and paving.
- 14. Performance of backfilling and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

#### 1.2 REFERENCES

#### A. Reference Standards:

- 1. ASTM International (Following are specifically referenced for fill and aggregate base testing):
  - a. ASTM D698-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))'.
  - b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
  - c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))'.
  - d. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
  - e. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.
  - f. ASTM D6938-15, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501.
  - 2. In addition to agenda items specified in Section 01 3100, Section 31 0501, and Section 31 2324 if Flowable Fill is included, review following:

- a. Review backfill requirements.
- b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
  - 1) Review requirements and frequency of testing and inspections.

# B. Sequencing:

- 1. Do not backfill against bituminous dampproofing to exterior of font foundation walls for twenty-four (24) hours after application of dampproofing.
- 2. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

#### C. Scheduling:

- 1. Notify Testing Agency and Architect seventy-two (72) hours minimum before installation of fill / engineered fill to perform proctor and plasticity index tests on proposed fill or subgrade.
- 2. Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of fill / engineered fill to allow inspection.
- 3. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical report prior to placing any fill (or concrete).
- 4. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

# 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports of fill / engineered fill.

# 1.5 QUALITY ASSURANCE

- A. Testing and Inspection:
  - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - 2. Owner will provide Testing and Inspection for fill / engineering fill:
    - a. Owner will employ testing agencies to perform testing and inspection for fill / engineering fill as specified in Field Quality Control in Part 3 of this specification.
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.

#### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not perform work during unfavorable conditions as specified below:
    - a. Aggregate Base:
      - 1) Presence of free surface water.
      - 2) Over-saturated sub base materials.

# PART 2 - PRODUCTS

#### 2.1 MATERIALS

A. Site Material:

- 1. Existing excavated material on site is not suitable for use as fill and backfill, but may be used elsewhere on site to meet Project requirements.
- B. Imported Fill / Backfill:
  - Well graded material conforming to ASTM D2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
    - a. Under Building Footprint, Site Elements, And Paved Areas: Use only engineered fill.
    - b. Under Landscaped Areas:
      - 1) Fill more than 36 inches below finish grade shall comply with soil classification groups GW, CL, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and ninety (90) percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
      - 2) Fill less than 36 inches below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches in any direction and ninety (90) percent minimum of fill shall be smaller than 3/8 inch in any direction.
- C. Engineered Fill (Use as sub-base under building footings, floor slabs, site elements, and paving:
  - Well-graded sandy gravel material free of organics, debris, or other deleterious materials, with no less than 5% and no more than 10% passing the #200 sieve, and no particles greater than 4 inches in maximum dimension.

#### PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Before placing fill, aggregate base, or finish work, prepare existing subgrade as follows:
  - 1. Do not place fill or aggregate base over frozen subgrade.
  - 2. Under Building Footprint, Site Elements, and Pavements:
    - a. Proof-roll by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice.
    - b. If any loose, soft, or disturbed zones are encountered, they must be completely removed beneath building footprint and replaced with granular engineered fill.
  - 3. Landscape Areas:
    - a. Compact subgrade to eighty-five (85) percent relative compaction.

# 3.2 PERFORMANCE

- A. Interface With Other Work:
  - 1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
  - 2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- B. Fill / Backfill:
  - General:
    - a. Around Buildings And Structures: Slope grade away from building as specified in Section 31 2216. Hand backfill when close to building or where damage to building might result.
    - b. Site Utilities:
      - 1) In Landscape Areas: Use backfill consisting of on-site soil.
      - 2) Under Pavement and Concrete Site Elements: Use compacted engineered fill.
    - c. Do not use puddling or jetting to consolidate fill areas.
  - 2. Compacting:
    - a. Engineered Fill And Aggregate Base:
      - 1) All fill material shall be well-graded granular material with maximum size less than 4 inch and with not more than ten (10) percent passing No. 200 sieve.
      - 2) Under Building Footings, Slab and Equipment Pad Areas:
        - a) Place in 8 inch maximum layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
      - 3) Under Driveways And Parking Areas:
        - a) Place in 8 inch maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.

- 4) Under Miscellaneous Concrete Site Elements And Outside Face of Foundation Walls:
  - Place in 8 inch maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
- 5) Utility Trenches:
  - a) Site:
    - (1) Place fill in 8 inch layers and moisture condition to plus or minus two (2) percent of optimum moisture content.
    - (2) Compact fill to ninety-five (95) percent minimum relative compaction to within 12 inches of finish grade.
    - (3) Compact fill above 12 inches to eighty-five (85) percent relative compaction.
  - b) Under Slabs:
    - (1) Under Slabs: Place fill in 6 inch layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and compact to ninety five (95) percent minimum relative compaction to within 4 inches of finish grade.
    - (2) Final 4 inches of fill shall be aggregate base as specified in Section 31 1123.
- b. Fill Slopes: Compact by rolling or using sheepsfoot roller.
- c. Landscape Areas:
  - 1) Compact fill to eighty-five (85) percent minimum relative compaction.
- d. Other Backfills: Place other fills in 12 inch layers and compact to ninety five (95) percent relative compaction.
- e. Loose material from compacted subgrade surface shall be immediately removed before placing compacted fill or aggregate base course.

# 3.3 REPAIR / RESTORATION

A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

# 3.4 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
  - 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor:
      - ) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
  - 2. Fill / Engineered Fill:
    - a. Testing Agency shall provide testing and inspection for fill.
    - b. Number of tests may vary at discretion of Architect.
    - Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill
      material.
    - d. Prior to placement of engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
    - e. Footing subgrade: At footing subgrades Certified Inspector is to verify that soils conform to geotechnical report.
    - Testing Agency will test compaction of soils according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Lift thicknesses shall comply with geotechnical report. Inspector shall determine that in-place dry density of engineered fill material complies with geotechnical report. Tests will be performed at following locations and frequencies:
      - 1) Paved Areas: At each compacted fill and backfill layer, at least one (1) test for every 10,000 sq. ft. or less of paved area but in no case less than three (3) tests.
      - 2) Building Slab Areas: At each compacted fill and backfill layer, at least on test for every 2,500 sq. ft. or less of building slab area but in no case less than three (3) tests.
      - 3) Foundation Wall/Continuous Footing Backfill: At each compacted backfill layer, at least one (1) test for each 40 linear feet or less of wall length, but no fewer than two (2) tests.
      - 4) Trench Backfill: At each 12 inch compacted lift for each 100 linear feet or less of trench length but no fewer than two (2) tests.
      - 5) Sidewalks, Curbs, Gutters, Exterior Pads: Minimum of one (1) test for each lift for each 40 lineal feet or one (1) test for every 5,000 sq. ft. or less of pad area but no fewer than three (3) tests.

- g. Required verification and inspection of soils as referenced in 2015 IBC (or latest approved edition) Table 1704.7 'Required Verification And Inspection Of Soils'. Periodic and continuous inspections include:
  - 1) Verify materials below shallow foundations are adequate to achieve design bearing capacity (periodic).
  - 2) Verify excavations are extended to proper depth and have reached proper material (periodic).
  - 3) Perform classification and testing of compacted fill materials (periodic).
  - 4) Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill (continuous).
  - 5) Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly (periodic).

#### 3.5 CLEANING

A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

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# SECTION 31 3116 TERMITE CONTROL

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete soils treatment with termiticide under and adjacent to building to provide uniform toxic barrier continuous treated zone in all routes of termite entry.
- B. Related Requirements:
  - 1. Section 31: Earthwork.
    - a. Section 31 0501: 'Common Earthwork Requirements'.
    - b. Section 31 1123: 'Aggregate Base':
      - 1) Installation of below-grade vapor retarder.
    - c. Section 31 2216: 'Fine Grading'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- Coordinate soil treatment application with excavation, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
- 2. Interior slab-on-grade concrete:
  - a. Coordinate work so vapor retarder can be installed as soon as possible after application of termite protection on top of soil base or aggregate base.

#### B. Pre-Installation Conference:

- 1. Participate in mandatory pre-installation conference.
- 2. Schedule pre-installation conference for new Projects after completion of Fine Grading specified in Section 31 2216, but before beginning Aggregate Base as specified in Section 31 1123. This conference may be held jointly with pre-installation conference for Common Planting Requirements specified in Section 32 9001.
- 3. In addition to agenda items specified in Section 01 3100, review following:
  - a. Review Applicator Qualification requirements.
  - b. Review Ambient Conditions for acceptability for application of termiticide products.
  - c. Review Delivery, Storage, and Handling requirements.
  - d. Review Examination, Preparation, and Application requirements as called out in Part 3 Execution.
  - e. Review Field Quality Control and Protection requirements as called out in Part 3 Execution.

# C. Sequencing:

- 1. Application OPTION A:
  - a. Apply termite protection on top of soil base before aggregate base and vapor retarder is installed.
- 2. Application OPTION B:
  - a. Install vapor retarder after application of termite protection on top of aggregate base.
  - b. Increase application rate for volume as per Manufacturer's instruction.
  - c. Install below-grade vapor retarder on top of soil base or aggregate base.

# 1.3 SUBMITTALS

#### A. Action Submittals:

- 1. Product Data:
  - a. Submit Chemical Manufacturer's printed literature regarding chemical composition, concentration, and rates and method of application.
  - b. Submit MSDS information.

#### B. Informational Submittals:

- Certificates:
  - a. Provide certificates required by any authorities having jurisdiction (AHJ).
- 2. Design Data Submittals:
  - a. Certified Applicator's statement indicating total amount of chemical required for Project to provide required amount of mix solution at specified concentration and application rates.
  - b. Certified Applicator to submit take-off showing amounts of square foot and lineal foot application at specified application rate. Also indicate total amount of mix solution required for Project.
- 3. Manufacturers' Instructions:
  - a. Manufacturer's printed label on product regarding chemical composition, concentration, and rates and method of application.
- 4. Qualification Submittals:
  - a. Provide BASF Partner Number and evidence of license from authorities having jurisdiction (AHJ).

#### C. Closeout Submittals:

- Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Include copy of final, executed warranty.
  - b. Record Documentation:
    - 1) Soil Treatment Application Report: After application of termiticide is complete, submit report including the following:
      - a) Date and time of application.
      - b) Moisture content of soil before application.
      - c) Termiticide brand name and batch number of concentrate.
      - d) Mix rate and quantity of diluted termiticide used.
      - e) Areas of application.
      - f) Weather at time of application.
      - g) Water source for application.

# 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.
- B. Qualifications:
  - 1. Applicator: Requirements of Section 01 4301 applies but not limited to the following:
    - a. Applicator shall be licensed pest professional according to regulations of authorities having jurisdiction (AHJ) with Manufacturer's Certification training in correct application methods to apply termite control treatment and products in jurisdiction where Project is located.
    - b. Applicator should be familiar with trenching, rodding, short rodding, subslab injection, low-pressure banded surface applications, and foam delivery techniques.
- C. Source Limitations:
  - 1. Obtain termite control products from single source from single manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, Storage, and Handling:
  - 1. Certified Applicator responsible for delivery, storage, handling, and dispose of specified products of this section.
- B. Storage And Handling Requirements:
  - 1. Storage:
    - a. Keep containers closed when not in use.
    - b. Store unused product in original container only, out of reach of children and animals.
    - c. Do not store near food or feed.
    - d. Protect from freezing.
  - 2. Spills or leaks:
    - a. General:
      - 1) In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent.
      - Avoid skin contact.

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- 3) Remove residue to chemical waste area.
- 4) Ensure adequate decontamination of tools and equipment following cleanup.
- b. All leaks resulting in application of this product in locations other than those prescribed must be cleaned up prior to leaving application site.
  - DO NOT allow people or pets to contact contaminated areas until cleanup is completed.

## C. Packaging Waste Management:

- 1. Disposal:
  - a. Dispose of empty containers in accordance with Manufacturer's and regulatory agency's requirements.
  - b. Do not contaminate water, food, or feed by storage or disposal.

#### 1.6 FIELD CONDITIONS

#### A. Ambient Conditions

1. Comply with EPA-Registered Label and requirements of authorities having jurisdiction (AHJ) and Manufacturer's written recommendations regarding environmental conditions under which termiticide shall be applied.

# B. Environmental Limitations:

- 1. To ensure penetration, do not treat soil that is water saturated or frozen.
- Do not treat soil (or aggregate base) while precipitation is occurring or movement from treatment area (site) is likely to occur.
- 3. Do not treat soil (or aggregate base) while large precipitation is expected to occurring within two to four (2-4) hours after application.

# 1.7 WARRANTY

# A. Manufacturer Warranty:

- 1. Provide Manufacturer's written warranty:
  - a. Warranty shall guarantee effectiveness of treatment against subterranean termite infestation for five (5) years minimum from acceptance date of Project and be signed by applicator and Contractor as coguarantors.
  - b. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

## PART 2 - PRODUCTS

#### 2.1 MATERIALS

# A. Termiticide:

- Description:
  - a. Provide EPA-Registered termiticide, complying with requirements of authorities having jurisdiction (AHJ), in aqueous solution formulated to prevent termite infestation.
  - b. Provide quantity required for application at label volume and rate for maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
- 2. Design Criteria:
  - a. Undetectable:
    - 1) Non-repellent or undetectable chemical technology.
  - b. Transfer Effect:
    - 1) Slow-acting treatment allowing individual termite's ample time to transfer treatment to other termites as they come in contact within the colony.
  - c. Service Life of Treatment:
    - Soil treatment termiticide that is effective for not less than five (5) years against infestation of subterranean termites.

# Mixes:

- a. Mix chemicals and water at Manufacturer's recommended printed requirements.
  - To provide maximum control and protection against termite infestation, apply as per Manufacturer printed instructions including but not limited to the following:

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- a) To maximize termiticide potency, product should be applied in manner to provide continuous treated zone to prevent termites from infesting wood to be protected.
- b) Product is labeled for use at 0.06 percent, 0.09 percent or 0.125 percent finished dilution. The 0.06 percent finished dilution should be used for typical control situations. Where severe termite infestations, problem soils, or difficult construction types are encountered, it may be advisable to use either 0.09 percent or 0.125 percent.
- 4. Category Four Approved Product. See Section 01 6200 for definitions of Categories. (No substitution of specified product or alteration of Manufacturer's application requirements is allowed):
  - Termidor by BASF Professional Pest Control, Research Triangle Park, NC www.termidorhome.com, or www.pestcontrol.basf.us.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Evaluation And Assessment:
  - 1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
  - 2. Proceed with application only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Protection Of In-Place Conditions:
  - 1. Allow no disturbance of treated soil (aggregate base) between application of solution and placing of concrete. (Disturbed defined as removing fill and/or replacing fill).
  - 2. Protect neighboring property, water sources, and personnel on site from contamination.
    - a. Use anti-backflow equipment or procedures.
    - b. Do not treat soil beneath structures that contain wells or cisterns.
    - c. Take extreme care to avoid runoff. Do not treat soil that is water-saturated or frozen.
  - 3. Maintain, on job site, empirical name of chemical, Manufacturer's precautions, and phone numbers of proper authorities to notify in case of spillage or other accident.
- B. General Preparation:
  - 1. Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's written instructions for preparation before beginning application of termite control treatment.
  - 2. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, trash, and construction waste wood from soil within and around foundations.
  - 3. Do not apply application of termite control until location of air ducts, vents, water, and sewer lines are known and identified. Take extreme caution to avoid contamination of these structural elements and airways.
- C. Soil Treatment Preparation:
  - 1. Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated
  - 2. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings.
  - Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
  - 4. Fit filling hose connected to water source at site with backflow preventer, complying with requirements of authorities having jurisdiction (AHJ).

# 3.3 APPLICATION

- A. Interface With Other Work:
  - 1. Interior slab-on-grade concrete:
    - a. Installation of vapor retarder and aggregate base.

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#### B. General:

- Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's EPA-Registered Label for products.
  - a. Application Restrictions:
    - 1) Do not apply while precipitation is occurring or large precipitation is expected to occurring within two to four (2-4) hours after application'.
    - 2) Do not contaminate water, food or feed. Cover or remove all exposed food, feed and drinking water.
    - 3) Do not apply with 15 feet of bodies of fresh water lakes, reservoirs, rivers, permanent streams, marshes, and natural ponds.
    - 4) Do not allow residents, children, other persons or pets into immediate area during application.
    - 5) Do not allow residents, children, other persons or pets into treated area until sprays have dried. After application, applicator is required to check for leaks resulting in deposition of treatment dilution in locations other than those prescribed.
- 2. Application OPTION B as specified in Sequencing of this specification in Part 1 General:
  - a. Increase application rate for volume as per Manufacturer's instruction.

# C. Applying Soil Treatment:

- 1. Mix treatment termiticide solution to a uniform consistency.
- Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
- 3. If impervious soils make reduction in volume of solution necessary, increase percentage of toxicant used in proportion to insure same amount of insecticide be used per linear or square foot.
- 4. Apply overall treatment to entire surface to be covered by concrete slab.

#### D. Pre-Construction Treatment:

- 1. For Slab-on-Grade Construction:
  - a. 4 gallons per 10 linear ft along outside of exterior foundation.
  - b. 2 gallons per 10 linear ft in voids of unit masonry foundation walls or piers.
  - c. One gallon per 10 sq ft as overall treatment under slab and attached porches.
  - d. 4 gallons per 10 linear ft along inside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab or where there will be break in concrete (grade changes, zip strips, cold joints, etc.).

#### 3.4 RE-APPLICATION

A. Reapply treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

#### 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Applicator:
    - a. Substitution of specified product or alteration of Manufacturer's application requirements is considered defective or not complying with Contract Document requirements. Correct such work at no cost to the Owner.

#### 3.6 PROTECTION

- A. Allow sufficient time (12 hours minimum) for drying after application before resuming construction activities.
- B. Keep off treated areas until completely dry. Do not allow workers or other personnel to enter treatment area until chemical has been absorbed into soil.
- C. Protect application areas from precipitation as recommended by Manufacturer.

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- D. Protect temiticide solution, dispersed in treated soils and fill, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- E. Post signs in areas of application warning of poison application. Remove signs when areas with application are covered by other construction.

END OF SECTION

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# NIBLEY 12 & MENDON UTAH STAKE CENTER

# **DIVISION 32: EXTERIOR IMPROVEMENTS:**

32 0100 32 0113	Operation and Maintenance of Exterior Improvements Penetrating Sealer
32 1000 32 1216 32 1723	Bases, Ballasts, and Paving Asphalt Paving - Marshall
32 3000 32 3113	Site Improvements
32 8000 32 8423	Irrigation Underground Sprinklers
32 9000	Planting
32 9001 32 9120	Common Planting Requirements Topsoil Placement
32 9121 32 9122	Topsoil Physical Preparation Topsoil Grading
32 9219 32 9223	Seeding Sodding
32 9300	Plants

# SECTION 32 0113 ASPHALT PAVING SURFACE TREATMENT: Asphalt Based Penetrating Seal

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and apply asphalt based penetrating seal on existing asphalt paving as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
  - Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 3. Section 32 1216: 'Asphalt Paving: Marshall Method'.
  - 4. Section 32 1723: 'Pavement Markings'.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. Asphalt Institute:
    - a. MS-4, 'The Asphalt Handbook' (Seventh Edition).
    - b. MS-16. 'Asphalt in Pavement Preservation and Maintenance' (Fourth Edition).
  - . Asphalt Emulsion Manufacturers Association:
    - a. MS-19, 'Basic Asphalt Emulsion Manual' (Fourth Edition).

## B. Definitions:

 Seal Coat: Thin surface treatment used to improve surface texture and protect asphalt surface. Main types of surface treatments are asphalt based emulsion seals, cape seals, chip seals, fog seals, micro surfacing, penetrating seals, refined coal tar emulsion seals, sand seals, sandwich seals and slurry seals.

# C. Reference Standards:

- 1. ASTM International:
  - a. ASTM D4552/D4552M-10, 'Standard Practice for Classifying Hot-Mix Recycling Agents'.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100:
  - 2. Schedule asphalt based penetrating seal pre-installation conference to be held jointly with any other 'Asphalt Surface Treatment' sections involving asphalt maintenance:
  - 3. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review asphalt based penetrating seal schedule.
    - b. Review asphalt based penetrating seal mix design.
    - c. Review asphalt based penetrating seal preparation requirements:
    - d. Review safety issues.

## B. Scheduling:

- 1. Manufacturer Instructions:
  - a. Provide to Owner's Representative at least seven (7) days before asphalt based penetrating seal placement commences, approved Laboratory Report and Manufacturer's Certificate of compliance with these specifications covering specific materials to be used on this project.

#### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Design Submittals:
    - a. Asphalt Based Penetrating Seal:
      - 1) Provide mix design for application rate of asphalt based penetrating seal.
  - Manufacturer Instructions:
    - a. Asphalt Based Penetrating Seal:
      - 1) Provide Manufacturer's written substrate preparation and sealant application instructions.
  - Qualification Statement:
    - a. Installer / Supervisor:
      - 1) Provide Qualification documentations if requested by Owner's Representative.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Asphalt based penetrating seal product literature.
        - b) Design Data Submittal.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies but not limited to following:
  - Installer:
    - a. Minimum five (5) years' experience in asphalt surface treatment installations.
    - b. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding:
      - 1) Project names and addresses.
      - 2) Date of installations.
  - 2. Supervisor:
    - a. Minimum of five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past five (5) years as Supervisor of Applicators:
      - 1) Project names and addresses.
      - 2) Date of installation.
      - 3) Name of Supervisor or Owner.
  - 3. Upon request, submit documentation.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Asphalt Based Penetrating Seal:
    - a. Following Manufacturer's recommendations.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Asphalt Based Penetrating Seal:
    - a. Do not apply asphalt based penetrating seal when ambient temperatures will be less than 55 deg F for twenty-four (24) hour period or surface temperature will be less than 60 deg F for twenty-four (24) hour period.
    - b. Do not apply asphalt based penetrating seal if subsequent temperatures for forty-eight (48) hours are anticipated to drop below 50 deg F.
    - c. Do not apply asphalt based penetrating seal if it will be adversely affected by rain, or wet conditions or when surface contains standing water.

#### PART 2 - PRODUCTS

# 2.1 MATERIAL

- A. Asphalt Based Penetrating Seal:
  - 1. Type One Acceptable Product and Manufacturers:
    - a. APR-100 by Mariani Asphalt (An Associated Asphalt Company), Tampa, FL (813) 623-3941, www.associatedasphalt.com/companies/mariani-asphalt.
    - b. GSB-78 Pavement Sealer and Rejuvenator by Asphalt Systems, Inc., Salt Lake City, UT (801) 972-6433 www.asphaltsystemsinc.com. (Use GSB-88 instead of GSB-78 on pavements less than two (2) years old).
    - c. GSB-88 Pavement Sealer and Rejuvenator by Asphalt Systems, Inc., Salt Lake City, UT (801) 972-6433 www.asphaltsystemsinc.com.
    - d. Quick-Dry Anti-Oxidene Penetrating Asphalt Coating (asphalt, air-blown (CAS# 64742-93-4),equal to /or not less than 50 to 65 percent by weight, white stoddard solvent (CAS# 8052-41-3) 35 to 50 percent by weight. No other unnecessary binders, fillers or additives) by Texas Refinery Corp., Fort Worth, TX (956) 492-6254 www.texasrefinery.com.
    - e. Reclamite Preservative Seal by Tricor Refining LLC, Bakersfield, CA (661) 393-7110 www.reclamite.com.
    - f. RS-90 Cutback Asphalt Seal Coating/Rejuvenator by Denver Industrial Sales & Service Company (DISSCO), Denver, CO (303) 935-2485 www.dissco.net.
    - g. Equal as approved by Owner's Representative before bidding. See Section 01 6200.
  - 2. Performance Requirement:
    - a. Asphalt Based Penetrating Seal consisting of the following:
      - Asphalt, CAS 8052-42-4 (or CAS 8052-41-3), 50 to 65 percent by weight and naphtha, CAS 8030-30-6, 35 to 50 percent by weight (or CAS 8008-20-9, 40 to 60 percent by weight) or white Stoddard solvent, CAS 64742-93-4, 35 to 50 percent by weight.
        - a) No water is acceptable.

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Evaluation And Assessment:
  - 1. Do not apply sealer on asphalt that has not aged for at least one (1) month minimum.
  - 2. Do not apply sealer over wet or damp pavement, or when precipitation is imminent.

### 3.2 PREPARATION

- A. Surface Preparation:
  - 1. General:
    - a. Do not allow irrigation watering for at least twenty-four (24) hours prior to application.
    - b. Do not apply to new asphalt pavements (less than one (1) month) in that softening may occur.
    - c. New asphalt and patched areas should be allowed to cure for at least thirty (30) days at 60 deg F temperature prior to application to eliminate any concentration of oils on pavement surface. Longer cure times of up to sixty (60) days may be required. New asphalt must not exhibit ribboning, crawling nor show oil rings when clean water is poured onto surface.
      - To determine if surface oils have dissipated, pour one (1) or two (2) gallons of clean water over pavement surface:
        - If water sheets out, uniformly wetting surface and no oil rings appear, surface is ready to be sealed.
        - If water balls up and/or shows signs of oil rings, additional curing time is required prior to sealing.
  - 2. Paint Stripes:
    - a. During Evaluation and Assessment, verify if acrylic, thermoplastic or paint stripes must be removed in preparation for asphalt based penetrating seal application.
  - 3. Grease or Oil Patches:
    - a. Remove grease or oil patches, and spillage of any material that has adhered to pavement. Do not place seal over unsound oil spots softened by fuel or oil.
    - b. Clean oil spots and treat with oil spot primer.

c. Seal areas damaged by oil or grease with an oil spot primer compatible with seal being used in accordance with Manufacturer's recommendations.

#### 4. Cleaning:

- a. Remove all debris, dirt, dust, leaves, loose material, moisture, mud spots, sand, silt spots, vegetation (including moss), water and other objectionable and foreign material from existing surface prior to placing seal. In areas where moss is prevalent, apply herbicide.
- b. Power brooms, power blowers, air compressors, vacuum sweepers, rotary brooms, water flushing equipment, and blowers, or by another approved method.

#### 3.3 APPLICATION

- A. Asphalt Based Penetrating Seal:
  - 1. Applied after Asphalt Paving is installed as specified in Section 1216: 'Asphalt Paving' as follows:
    - a. Mandatory Asphalt Paving Surface Treatment (Asphalt Based Penetrating Seal) to be applied no sooner than thirty (30) days or no later than eighteen (18) months of placing Asphalt Paving to be included with this project.
  - 2. Surface preparation:
    - a. Do not apply asphalt based penetrating sealer until completion of surface preparation items.
  - 3. Follow Manufacturer's recommendations for application of sealer.
  - 4. Apply sealer without thinning from container using squeegee, brush, or sprayer at rate of 1-1/2 gallons per 100 square feet minimum and 2 gallons per 100 square feet maximum, depending on absorbency of pavement.
- B. Paint Stripes:
  - 1. Apply paint stripes after asphalt based penetrating seal has been applied and cured.

#### 3.4 CLEANING

- A. General:
  - 1. Upon completion of asphalt based penetrating seal operations, clean up and remove debris.

# 3.5 PROTECTION

- A. Do not allow traffic on paving until asphalt based penetrating seal is thoroughly cured:
  - 1. Warm weather condition is approximately twenty-four (24) hours.
- B. Do not allow irrigation watering for at least twenty-four (24) hours after application.

#### END OF SECTION

# SECTION 32 1216 ASPHALT PAVING: Marshall Method

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install asphalt paving in driveways and parking areas as described in Contract Documents including the following, but not limited to:
    - a. Asphalt Mix Design Criteria Summary:

1) Asphalt Binder: PG 58-28
2) Maximum size Aggregate: (1/2 inch)
3) Marshall Blow Count: 50

4) Stability: 1200 pounds minimum
5) Flow: 8 minimum, 16 maximum

6) Antistrip Agent: If required by supplier's mix design (use 1 percent or greater lime

slurry when required

7) ROSP Not allowed.

8) Warm Mix Additive If required by supplier's mix design 9) Recycle Agent: If required by supplier's mix design

- b. Design Air Voids:
  - 1) Three and one-half percent (3.5 percent).
- c. Tack coat: Application of asphaltic material to existing asphalt concrete or portland concrete surfaces before asphalt concrete pavement.
- d. Blotter materials and procedures for absorbing excess asphalt as required.

#### B. Related Requirements:

- Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
- 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
- 3. Section 01 4301: 'Quality Assurance Qualifications' establishes minimum qualification levels required.
- 4. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- 5. Section 01 7800: 'Closeout Submittals'.
- 6. Section 31 0501: 'Common Earthwork Requirements' for:
  - a. General procedures and requirements for earthwork.
  - Pre-installation conference held jointly with other common earthwork related sections.
- 7. Section 31 1123: 'Aggregate Base' for compaction of aggregate base.
- 8. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
- 9. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- 10. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
- 11. Section 32 0113.01: 'Asphalt Paving Surface Treatment: Penetrating Seal'.
- 12. Section 32 1723: 'Pavement Markings'.

# 1.2 REFERENCES

- A. Association Publications:
  - 1. Asphalt Institute, 2696 Research Park Dr., Lexington, KY www.asphaltinstitute.org:
    - a. MS-2, 'Mix Design Methods' (7th Edition 2015).

#### B. Definitions:

- 1. Aggregate: Hard inert mineral material, such as gravel, crushed rock, slag, or sand.
  - a. Coarse Aggregate: Aggregate retained on or above No. 8 (2.36 mm) sieve.
  - b. Coarse-Graded Aggregate: Aggregate having predominance of coarse sizes.
  - c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.
  - d. Fine Aggregate: Aggregate passing No. 8 (2.36 mm) sieve.

- e. Fine-Graded Aggregate: Aggregate having predominance of fine sizes.
- f. Mineral Filler: Fine mineral product at least 70 percent of which passes a No. 200 (75µm) sieve.
- 2. Air Voids: Total volume of small air pockets between coated aggregate particles in asphalt cement concrete (ACC); expressed as percentage of bulk volume of compacted paving mixture.
- 3. Anti-Stripping Agent: Chemicals added to bitumen to improve the adhesion of the bitumen to hydrophilic aggregates
- 4. Asphalt Binder: Asphalt cement or modified asphalt cement that binds aggregate particles into dense mass.
  - a. Asphalt Cement used in paving applications that has been classified according to the Standard Specification for Performance Graded Asphalt Binder, AASHTO Designation MP 320. It can be either unmodified or modified Asphalt Cement, as long as it complies with specifications.
- 5. Asphalt-Aggregate Designator: Alpha-numeric code that indicates nominal maximum size of aggregate, and type and grade of asphalt in aggregate-asphalt mix.
  - a. Example: "12.5 PG70-28" means aggregate asphalt mix shall be composed of aggregate gradation with 1/2 inch nominal maximum size and performance grade asphalt binder designed to perform between temperatures of 158 deg F and -18.4 deg F.
- 6. Equivalent Single Axle Load (ESAL): Effect on pavement performance of any combination of axle loads of varying magnitude equated to number of 18,000-lb. single-axle loads that are required to produce an equivalent effect.
- 7. Performance Graded Asphalt Binder (PGAB): Asphalt binder designed to produce HMA that meets certain performance standards. Designations for performance-graded asphalt binders are prefixed with PG. Each grade designation also includes two sets of numbers that denote temperature range. This is a range of climate temperatures to which road may be exposed and still be expected to give superior performance. PG numbers do not indicate viscosity as in conventional liquid asphalt designations.
- 8. Pre-emergent Herbicide: Chemical that is applied before weeds emerge. It acts by killing weed seedlings and /or establishing layer of chemical on or near soil surface that is toxic to germinating seeds and young seedlings.
- 9. Subgrade (definition varies depending upon stage of construction and context of work being performed):
  - a. Prepared natural soils on which fill, aggregate base, or topsoil is placed.
    - Prepared soils immediately beneath paving.
- 10. Tack Coat: Very light application of liquid asphalt, or asphalt emulsion diluted with water.

#### C. Reference Standards:

- 1. American Association of State and Highway Transportation Officials:
  - a. AASHTO T 304-11, 'Standard Method of Test for Uncompacted Void Content of Fine Aggregate'.
  - b. AASHTO T 322-07(2011), 'Standard Method of Test for Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device.
- 2. ASTM International:
  - a. ASTM C29/C29M-16, 'Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate'.
  - b. ASTM C88-13, 'Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate'.
  - c. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
  - d. ASTM C142/C142M-10, 'Standard Test Method for Clay Lumps and Friable Particles in Aggregates'.
  - e. ASTM D242/D242M-09(2014), 'Standard Specification for Mineral Filler For Bituminous Paving Mixtures'.
  - f. ASTM D977-13, 'Standard Specification for Emulsified Asphalt'.
  - g. ASTM D979/D979M-15, 'Practice for Sampling Bituminous Paving Mixtures'.
  - h. ASTM D2041/D2041M-11, 'Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures'.
  - i. ASTM D2172/D2172M-11, 'Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures'.
  - j. ASTM D2256/ D2256M-10, 'Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method'.
  - k. ASTM D2397/D2397M-13, 'Standard Specification for Cationic-Emulsified Asphalt'.
  - I. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
  - m. ASTM D2726/D2726M-14, 'Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures'.
  - ASTM D2950/D2950M-14, 'Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods'.
  - o. ASTM D3203/D3203M-11, 'Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures'.
  - p. ASTM D3549/D3549M-11, 'Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens'.
  - q. ASTM D3665-12, 'Standard Practice for Random Sampling of Construction Materials'.
  - r. ASTM D4318-10, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
  - s. ASTM D4552/D4552M-10, 'Standard Practice for Classifying Hot-Mix Recycling Agents'.

- t. ASTM D4791-10, 'Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate'...
- u. ASTM D5444-15, 'Standard Method for Mechanical Size Analysis of Extracted Aggregate'.
- v. ASTM D5821-13, 'Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate'.
- w. ASTM D6307-10, 'Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method'.
- x. ASTM D6931-12, 'Standard Test Method for Indirect Tensile (IDT) Strength of Bituminous Mixtures'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - Participate in MANDATORY pre-installation conference as specified in Section 31 0501 'Common Earthwork Requirements':
  - 2. In addition to agenda items specified in Section 01 3100 'Project Management and Coordination' and Section 31 0501 'Common Earthwork Requirements', review following:
    - a. Review surveying and staking of parking areas and installation of sleeves.
    - b. Review proposed aggregate base schedule.
    - c. Review rough grading elevations before fine grading operations.
    - d. Review fine grading elevations of subgrade fine grading operations before placing aggregate base and paving.
    - e. Review proposed asphalt paving schedule.
    - f. Review asphalt paving mix design.
    - g. Review pre-emergent herbicide protection of adjoining property and planting area on site requirements, schedule and application requirements.
    - h. Review schedule of mandatory asphalt paving surface treatment to be applied after placement of asphalt paving.
    - i. Review schedule of paint stripes to be applied after asphalt paving surface treatment.
    - j. Review safety issues.
    - k. Review Section 01 4523 'Testing and Inspecting Services' for administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
      - 1) Review requirements and frequency of testing and inspections.
      - 2) Review Contractor Testing Agency Qualifications.
- B. Scheduling: Notify Testing Agency and Architect twenty-four (24) hours minimum before placing asphalt paving.

# 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Pre-Emergent Herbicide:
      - 1) Manufacturer's published product data on pre-emergent herbicide.
- B. Informational Submittals:
  - Certificates:
    - a. Require mix plant to furnish delivery/load tickets for each batch of asphalt. Keep delivery tickets at job-site for use of Owner's Representative. Tickets shall show following:
      - 1) Name of mix plant.
      - 2) Date.
      - 3) Name of contractor.
      - 4) Name and location of Project.
      - 5) Serial number of ticket.
      - 6) Asphalt mix type.
      - 7) Time loaded.
      - 8) Identity of truck.
    - b. Installer to provide Manufacturer's Certificate of Compliance stating material authenticity and properties for review and acceptance by Architect before product use.
  - 2. Design Data:
    - a. Hot Mix Asphalt:
      - 1) Design Criteria:
        - Develop mix design according to current Asphalt Institute MS-2, 'Mix Design Methods' for Marshall Method.
        - b) Submittal format:

- (1) Design mix submittal shall follow format as indicated in current Asphalt Institute MS-2, 'Mix Design Methods.
- 2) Mix design of asphalt paving must meet Design Criteria minimum requirements and show conformance to the following:
  - Location and name of hot mix asphalt concrete production facility.
  - b) Date of mix design. If older than two (2) years, recertify mix design.
  - c) Asphalt mix type.
  - d) Mix design method used.
  - e) Mix density.
  - f) Design air voids (three and one half (3.5) percent.
  - g) Asphalt content in percent.
  - h) Performance grade of asphalt binder.
  - i) Nominal maximum size of aggregate.
  - i) Aggregate source and gradation.
  - k) Mix properties and design parameters.
  - 1) Temperature of mix at plant and in the field for optimum field compaction.
  - m) Mineral fillers, antistrip, and recycle agent percentages.
  - n) Identify if warm mix technologies will be used and how much warm mix additive will be used.
- 3) Within thirty (30) days prior to asphalt construction, submit actual design mix to Architect, Civil Engineering Consultant of Record and Independent Testing Laboratory for review and approval.
- 3. Test And Evaluation Reports:
  - a. Hot Mix Asphalt:
    - Contractor's Testing Agency copies of Field Test results to show compliance with all contract requirements and quality control for quality of asphalt mixture and asphalt installation.
    - Owner's Testing Agency copies of Field Tests and Inspections used to validate or determine discrepancies with testing by Contractor.
- 4. Manufacturer Instructions:
  - a. Pre-Emergent Herbicide:
    - 1) Application instructions for pre-emergent herbicide.
- 5. Qualification Statement:
  - a. Installer:
    - 1) Provide Qualification documentation if requested by Owner's Representative.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800 'Closeout Submittals':
    - a. Record Documentation:
      - 1) Manufacturer's documentation:
        - a) Pre-emergent herbicide documentation.
        - b) Asphalt paving design.
        - c) Test reports.
        - d) Certificates from mix plant of delivery/load tickets.
        - e) Manufacturer's Certificate of Compliance.
      - 2) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports of asphalt paving.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 'Quality Assurance Qualifications' applies but not limited to following:
  - 1. Asphalt Paving:
    - a. Foreman of asphalt paving crew has completed at least three (3) projects of similar size and nature.
    - b. Upon request, submit documentation.
  - 2. Pre-emergent herbicide:
    - a. Applicator:
      - 1) Pre-emergent herbicide shall be applied by applicator certified by State in which Project is located as an applicator of agricultural chemicals.
- B. Testing and Inspection:
  - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
  - 2. Owner will provide Testing and Inspection for asphalt paving:

- a. Owner will employ testing agencies to perform testing and inspection for asphalt paving as specified in Field Quality Control in Part 3 of this specification.
  - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
  - 2) See Section 01 1200: 'Multiple Contract Summary'.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Asphalt Material:
    - a. Each shipment must:
      - 1) Be uniform in appearance and consistency.
      - 2) Show no foaming when heated to specified loading temperature.
    - Do not supply shipments contaminated with other asphalt types or grades than those specified:
      - 1) Do not use petroleum distillate as a release agent.
  - 2. Pre-emergent herbicide:
    - a. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
  - 1. Pre-emergent herbicide:
    - a. Do not freeze. Store in at temperatures above 41 deg F.
    - b. Follow Manufacturer's storage and handling requirements.

#### 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Pre-emergent herbicide:
    - a. Follow printed Manufacturers instruction for environmental hazards:
    - b. Follow printed Manufacturers instruction ambient conditions for application of product.
  - 2. Tack Coat:
    - a. Apply only when air and roadbed temperatures in shade are greater than 40 deg F. Temperature restrictions may be waived only upon written authorization from Architect or Civil Engineer.
    - b. Do not apply to wet surfaces.
    - c. Do not apply when weather conditions prevent tack coat from adhering properly.
  - Asphalt paving:
    - a. Do not perform work during following conditions:
      - 1) Ambient temperature is below 45 deg F or will fall below 45 deg F during placement.
      - 2) Temperature of aggregate base below 50 deg F.
      - 3) Cold Weather Asphalt Paving Plan: If asphalt pavement is placed outside of these temperature limits or those identified in MINIMUM Temperature Degrees, a plan is required which includes:
        - a) Haul times.
        - b) Placement details.
        - c) Compaction aids used in production.
        - d) Owner does not assume responsibility for asphalt when placed outside temperature limits.
      - 4) Presence of free surface water or weather is unsuitable.
      - 5) Over-saturated aggregate base and subgrade materials.
      - 6) Wind or ground cools mix material before compaction.

# PART 2 - PRODUCTS

# 2.1 DESIGN CRITERIA:

- A. General:
  - 1. Follow current Asphalt Institute MS-2 'Asphalt Mix Design Methods' for Marshall Method.
- B. Asphalt Mix:
  - 1. Asphalt Binder:

- a. Performance Graded Asphalt Binder:
  - 1) Use performance graded asphalt binder identified under Asphalt Mix Design Criteria.
- 2. Aggregates:
  - Use clean, hard, durable, angular, sound, consisting of crushed stone, crushed gravel, slag, sand, or combination.
  - b. Provide aggregate material properties to meet **Table 1 AGGREGATE PHYSICAL PROPERTIES** requirements:

Table 1 –AGGREGATE PHYSICAL PROPERTIES							
Property ASTM ESAL Min Max							
Coarse Aggregate (does i	not pass No. 4 si	eve)					
			less than 0.3	55			
Angularity (fractured faces), p	percent	D5821	0.3 to 3.0	75			
			greater than 3.0	85/80			
			less than 0.3		40		
Wear (hardness or toughness	s), percent	C131/C131M	0.3 to 3.0		35		
			greater than 3.0		35		
Flats or elongates (3:1 length to width), percent, maximum		D4791			20		
Fine Aggregate (passing	No. 4 sieve)						
			less than 0.3				
Angularity (uncompacted voice percent (AASHTO T304)	d content),		0.3 to 3.0	40			
percent (AASITTO 1304)			greater than 3.0	45			
			less than 0.3	40			
Sand equivalent, percent		D2419	0.3 to 3.0	40			
			greater than 3.0	45			
Friable particles, percent		C142/C142M			2		
Dlastic limit mavimum	Liquid limit	D4318			25		
Plastic limit, maximum	Plastic limit	D4318			6		

# Notes:

- 1. ESAL in millions.
- 2. Angularity by weight retained above 9 mm sieve, with at least one fractured face. 85/80 denotes 85 percent coarse aggregate has one fractured face and 80 percent has two or more fractured faces.
- 3. Wear of aggregate retained above 2.36 mm sieve unless specific aggregates have higher values are known to be satisfactory.
- 4. Flats or elongates retained above 4.75 mm sieve.
- 5. Friable particles passing No. 4.75 mm sieve.
- 6. Plasticity, passing No. 4.75 sieve. Aggregate is no-plastic even when filler material is added to aggregate.

Blended Physical Properties						
Dry-rodded unit weight, lb/ft <sup>3</sup> , minimum	C29/C29M		75			
Weight loss (soundness), percent, maximum	C88	-		16		
Clay content or cleanliness (sand	D2419	less than 0.3	45			
equivalent), percent	D2419	more than 0.3	60			

# Notes:

- 1. Weight loss using sodium sulfate.
- 2. Sand equivalent value is after going through dryer or before drum mixer. The sand equivalent requirement is waived for RAP aggregate but applies to remainder of aggregate blend.
- 3. Friable particles of clay lumps, shale, wood, mica, and coal passing 4.75 sieve.

# 2.2 MATERIAL

A. Aggregate Base: Conform to applicable requirements as specified in Section 31 1123: 'Aggregate Base'.

# B. Asphalt Paving Surface Treatment:

- 1. Include mandatory Asphalt Paving Surface Treatment to be applied no sooner than thirty (30) days or no later than eighteen (18) months of placing Asphalt Paving to be included with this project:
  - a. Asphalt Based Penetrating Seal as specified in Section 32 0113 'Asphalt Paving Surface Treatment: Asphalt Based Penetrating Seal'.

#### C. Pre-Emergent Herbicide:

- Design Criteria:
  - a. Selective type pre-emergence control chemical containing forty (40) percent Trifluralin minimum for control of annual grasses and broadleaf weeds.
  - b. Non-oil based sterilant.
  - c. Labeled for under-pavement use.
- 2. Type Two Acceptable Products:
  - a. Treflan E.C. by Monterey AgResources, Fresno, CA www.montereyagresources.com (available in western United States).
  - b. Trust 4EC by WinField Solutions LLC (Agrilsolutions), St Paul, MN www.agrisolutionsinfo.com (available in United States).
  - c. Equal as approved by Architect before installation. See Section 01 6200.

#### D. Tack Coat:

 Emulsified asphalt meeting requirements of ASTM D977, Grade SS-1H, CQS-1H, or ASTM D2397/D2397M, Grade CSS-1H.

#### PART 3 - EXECUTION

#### 3.1 INSTALLERS

A. Approved Applicators. See Section 01 4301 'Quality Assurance - Qualifications':

# 3.2 PREPARATION

#### A. General:

1. Aggregate base and paving must be placed before any moisture or seasonal changes occur to subgrade that would cause compaction tests previously performed to be erroneous. Re-compact and retest subgrade soils that have been left exposed to weather.

# B. Protection Of In-Place Conditions:

- 1. Pre-emergent herbicide:
  - a. Take necessary precautions to protect adjoining property and areas designated for planting on building site.
  - b. Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes.
- 2. Asphalt Paving:
  - a. Protect all structures, including curb, gutter, sidewalks, guard rails and guide posts.
  - b. Protect neighborhood, storm drains and down-stream fish habitat.

# C. Surface Preparation:

- 1. Survey and stake parking surfaces to show grading required by Contract Documents.
- 2. Subgrade (soil below aggregate base):
  - a. Prepare natural soil subgrade as specified in Section 31 2213 'Rough Grading' or prepare fill subgrade as described in Section 31 2216 'Fine Grading'.
  - b. Application shall be no more than one (1) day before installation of granular road base.
- 3. Aggregate base:
  - a. Finish grade parking surface area to grades required by Contract Documents.
  - b. Compact aggregate base as specified in Section 31 1123 'Aggregate Base'.
  - c. Tolerances:
    - 1) Elevation of aggregate base shall be 0.00 inches high and no more than 1/2 inch low.
    - 2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
- 4. Tack coat:
  - Clean surface of all materials such as mud, dirt, leaves, etc. that prevent tack from bonding to existing surfaces.

- 1) If flushed, allow surface to dry.
- 5. Asphalt paving:
  - a. Area shall be clean and tack coat applied before placing of asphalt paving.
    - Remove all moisture, dirt, sand, leaves, and other objectionable material from prepared surface before placing asphalt.
    - 2) Locate, reference, and protect all utility covers, monuments, curb, and gutter and other components affected by asphalt paving operations.
    - 3) Allow sufficient cure time for tack coat before placing asphalt.

#### 3.3 APPLICATION

- A. Interface With Other Work:
  - 1. Section 31 1123: 'Aggregate Base' for compaction of aggregate base.
  - 2. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
  - 3. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
  - 4. Section 31 2323: 'Fill' for compaction procedures and tolerances.
- B. Pre-Emergent Herbicide:
  - 1. Asphalt paving areas:
    - a. Follow Manufacturer's printed application requirements:
    - b. Apply to prepared subgrade dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended amount of chemical will be applied to every 1000 sq ft and liquid will penetrate minimum of 2 inches.
    - c. Application shall be no more than one (1) day before installation of aggregate base.

#### C. Tack Coat:

- 1. General:
  - a. Tack coat vertical surfaces or existing asphalt cement concrete or portland cement concrete that will be in contact with asphalt paving.
  - b. Use tack coat diluted to a 2:1 (concentrate water) ratio.
  - c. Use pressure distributor to apply in uniform, continuous spread.
  - d. Cover all tacked surface areas with surfacing materials same day of application.
- 2. Application rate. Typically as follows:
  - a. Emulsions, 0.08 to 0.15 gallons per sq yd of diluted material:
    - 1) Apply sufficient to achieve ninety five (95) percent or better coverage of existing surfaces.
    - 2) Above application rates may vary according to field conditions. Obtain approval from Civil Engineer for quantities, rate of application, temperatures, and areas to be treated before any application.

# D. Asphalt Paving:

- 1. General:
  - a. Paving adjacent to cast-in-place concrete site elements shall be between 1/4 inch higher than concrete.
  - b. Surface texture of hand worked areas shall match texture of machine-laid areas.
  - c. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch.
  - d. Cross Slope: 1/4 inch in 10 feet perpendicular to centerline except at cross section grade breaks.
  - e. Grade: 1/8 inch in 10 feet parallel to centerline.
  - f. Do not place on frozen aggregate base or during adverse climatic conditions such as precipitation or when roadway surface is icy or wet.
  - g. Uniformly mix materials so aggregate is thoroughly coated with asphalt.
  - h. Place at temperatures established by the mix design with self-propelled laydown machine.
  - i. Use Table 2 MINIMUM TEMPERATURE, DEGREES as guide:

Table 2 – MINIMUM TEMPERATURE, DEGREES							
Ambient Air	Ambient Air	Compacted Paving Mat Thickness					
Temperature Deg F.	Temperature Deg C.	3/4" (19 mm)	1" (25 mm)	1 1/2" (38 mm)	2" (50 mm)	3" (75 mm)	4" + (100 mm) +
45 – 50	7 – 10					280	265
50 – 59	10 – 15				280	270	255
60 – 69	16 – 20			285	275	265	250
70 – 79	21 – 79	285	285	280	270	265	250
80 - 89	27 - 31	280	275	270	265	260	250
90+	32+	275	270	265	260	250	250

 Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.

# 2. Compaction:

- a. Compact asphalt paving to ninety-six (96) percent minimum of Marshall value. Determine percent compaction by ASTM D2950/D2950M.
  - 1) Alternate density and compaction:
    - Compact asphalt paving to ninety-four (94) percent of Maximum Theoretical Specific Gravity minimum plus three (3) percent and minus two (2) percent. Determine percent compaction by D2041/D2041M.
- b. Roll with powered equipment capable of obtaining specified density while providing required smoothness.
- c. Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum:
- d. Complete handwork compaction concurrently with breakdown rolling.
- e. Execute compaction so visibility of joints is minimized:
- f. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm.
- g. Do not use vibration for finish rolling.

# 3. Lift Thickness:

- a. Preferred Method:
  - 1) For pavements 3-1/2 inch or thinner apply asphalt paving in single lift.
  - 2) For pavements greater than 3-1/2 inch, use alternate method below.
- b. Alternate Method:
  - 1) Asphalt paving may be applied in two (2) lifts, first 2 inches thick minimum and second 1 1/2 inches thick minimum following temperature recommendations of following paragraph.
  - 2) Surface of first lift shall be clean and provide tack coat between first and second lifts.
  - 3) Provide not less than two (2) times maximum aggregate size in compacted asphalt concrete mixes.

#### E. Asphalt Paving Surface Treatments:

- 1. Apply mandatory Asphalt Paving Surface Treatment no sooner than thirty (30) days or no later than eighteen (18) months of placing Asphalt Paving to be included with this project. Do not apply prior to asphalt curing (refer to 'Asphalt, Concrete and Pervious Concrete Maintenance Guidelines'):
  - a. Asphalt Based Penetrating Seal as specified in Section 32 0113.01 'Asphalt Paving Surface Treatment: Asphalt Based Penetrating Seal'.

# F. Paint Stripes:

1. Apply paint stripes after asphalt paving surface treatment has been applied to asphalt paving.

#### 3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
  - Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
    - a. Quality Control is sole responsibility of Contractor:
      - Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - Testing and inspections will be responsibility of Contractor to be performed by an independent entity.

- 2) Contractor bears full responsible for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.
- B. Field Tests (Provided by Contractor):
  - General:
    - a. Contractor bears full responsibility for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.
    - Testing and Inspection Reports to be distributed as specified in Section 01 4523 'Testing And Inspection Services'.
  - 2. Compaction Tests:
    - Contractor to provide compaction tests of asphalt being placed to establish rolling patterns and installation procedures.
    - b. Compaction tests by Contractor are independent of compaction tests being provided by Owner. See Section 01 4523 'Testing And Inspection Services'.
    - c. Compact asphalt paving to ninety-six (96) percent minimum of Marshall value. Determine percent compaction by ASTM D2041/D2041M:
      - 1) Alternate density and compaction:
        - a) Compacted to ninety-four (94) percent of Theoretical Maximum Specific Gravity (Rice) minimum plus three (3) percent and minus two (2) percent. Determine percent compaction by ASTM D2950/D2950M.
  - Thickness Tests:
    - a. Determine thickness of paving being placed, no less than one (1) test per 10,000 sq. ft. of paving or portion thereof, three (3) tests minimum.
- C. Field Tests And Inspections (Provided by Owner):
  - 1. General:
    - Compaction tests provided by Owner will be used to validate or determine discrepancies with testing by Contractor.
    - b. Civil engineer applies pay factor for Gradation/Asphalt Content, In-Place Density. Civil engineer computes pay factor for each lot.
    - c. Opening paved surface to traffic does not constitute acceptance.
    - d. Unless required by the Owner's Representative, Testing Agency is to base compaction testing on the Contractor's submitted mix design for theoretical maximum specific gravity (Rice) or Marshall specific gravity (Bulk) values.
    - e. Asphalt-aggregate mix sampling as per ASTM D979/D979M.
      - 1) Test for:
        - a) Air voids as per ASTM D3203/D3203M.
        - b) Asphalt binder content as per ASTM D6307.
        - c) Aggregate gradation as per ASTM D5444.
    - f. Lot size: 10,000 sq. ft. or part thereof.
    - g. Sub lot size: 5,000 sq. ft. or part thereof.
  - 2. At Site Testing and Inspection:
    - a. Asphalt Paving:
      - Testing Agency shall provide full time nuclear density testing and inspection for asphalt paving during asphalt paving operations (nuclear density testing is informational testing only and does not constitute acceptance by Owner).
      - 2) Inspection to include:
        - a) Aggregate coating.
        - b) Compaction control and effort required.
        - c) Suitability of spreading and asphalt paving equipment.
        - d) Temperature of mix as delivered and placed.
          - (1) Reject mixes exceeding 325 deg Fin transport vehicle as required in Non-Conforming Work below.
          - (2) Dispose of cold mix in paver hopper as thin spread underlay.
      - 3) Field Tests:
        - a) When tested with 10 foot straight edge, surface of completed work shall not contain irregularities in excess of 1/4 inch.
        - b) Determine percent compaction per ASTM D2950/D2950M unless other nondestructive nonnuclear methods such as sonar are used.
        - c) Provide written nuclear density testing, or other nondestructive nonnuclear methods such as sonar of asphalt paving at minimum rate of one (1) per 2,500 sq. ft. Select test locations by ASTM D3665 and sample per ASTM D979/D979M before compaction. Minimum of three (3) tests required.

- d) Compact asphalt paving to ninety-six (96) percent minimum of Marshall/Bulk value. Determine percent compaction by ASTM D2950/D2950M:
  - (1) Alternate density and compaction:
    - (a) Compact asphalt paving to ninety-four (94) percent of Theoretical Maximum Specific Gravity (Rice) plus three (3) percent or minus two (2) percent. Determine percent compaction by ASTM D2041/D2041M.
- e) Maximum average total air voids in completed hot mix asphalt shall be eight (8) percent but more than three (3) percent as determined by ASTM D2041/D2041M.
- f) Determine thickness of paving being placed, no less than one (1) test per 10,000 sq. ft. of paving or portion thereof, three (3) tests minimum.

# 3. At Laboratory Testing:

- a. General:
  - 1) Provide at least one (1) laboratory test series for every 10,000 sq. ft. or part thereof (minimum of one (1) test):
    - a) Test reports will show compliance with Contract Documents regarding type of aggregate base, depth of aggregate base, depth and density of asphalt paving, asphalt content, aggregate gradation, flow and stability, bulk specific gravity and maximum specific gravity.
    - b) Reports will also give test procedures used by testing laboratory.
- b. Compaction and Final Density:
  - 1) Pavement thickness and final density to be determined by results of coring. Provide one (1) core per 10,000 sq. ft. or part thereof. Minimum of three (3) tests required:
    - a) Based upon core samples, compaction is acceptable if test deviations are within pay factor 1.00 limits
    - b) At Project Manager's discretion, after consulting with design team, a Lot with a sub-lot test deviation greater than Reject may stay in place at fifty (50) percent cost.
    - c) Select test locations by ASTM D3665 and sample per ASTM D979/D979M after compaction.
- c. Compaction Pay Factor:
  - 1) Based upon core samples, compaction is acceptable if test deviations are within pay factor 1.00 limits.
  - 2) At Project Manager's discretion, after consulting with design team, a Lot with a sub-lot test deviation greater than Reject may stay in place at fifty (50) percent cost.
  - 3) Average Density, in percent as per **Table 3 COMPACTION PAY FACTORS**:

Table 3 – MINIMUM TEMPERATURE, DEGREES (96 percent of laboratory required – Marshall Method ASTM D2726/D2726M)			
Actual Density percent As Compared Marshall/Bulk Density	Pay Factor Applied to Bid Asphalt Qualities		
96.0	100.0		
95.9	99.7		
95.8	99.3		
95.7	98.9		
95.6	98.4		
95.5	97.8		
95.4	97.1		
95.3	96.4		
95.2	95.8		
95.1	94.6		
95.0	93.4		
94.9	92.2		
94.8	90.7		
94.7	89.1		
94.6	87.8		
94.5	85.1		
94.4	82.6		
94.3	79.5		
94.2	75.5		
94.1	69.7		

94.0	60.0
Under 94.0	REJECT

d. Average Density determined by alternate method as shown in following Table 4 – COMPACTION PAY FACTORS:

Table 4 – COMPACTION PAY FACTORS  (94 percent of theoretical maximum specific gravity – Superpave (Rice)  (ASTM D2041/D2041M plus three (3) or minus two (2) percent)				
Pay Factor	Density, in Percent			
Fay Facion	Average	Lowest Test		
0.70	More than 96			
1.00	92 to 96	89 or Greater		
0.90	92 to 96	Less than 89		
Reject	Less than 92			

#### Notes:

- At Contractor's discretion and expense, do Hamburg wheel track test (AASHTO T 304) on 3 additional random core samples from non-complying sub-lot of 5,000 sq. ft. Sublot will be accepted if average rut depth is less than 10 mm at 20,000 passes.
- e. Pavement Thickness:
  - 1) Pavement thickness and final density to be determined by results of coring. Provide one (1) core per 10,000 sq. ft. Minimum of three (3) tests required if under 30,000 sq. ft.
    - a) Acceptance will be based on the average of all thickness tests.
    - b) At Project Manager's discretion, after consulting with design team, payment may be made for areas deficient in thickness by more than 0.75 inches at fifty (50) percent. If not, remove and replace at no additional cost to the Owner in following Table 5 – THICKNESS PAY FACTORS:

Table 5 – THICKNESS PAY FACTORS				
Pay Factors	Thickness Deficiency, in Inches (ASTM D3549/D3549M)			
1.00	0.00 to 0.25			
0.90	0.26 to 0.50			
0.70	0.51 to 0.75			
Reject	0.76 to 1.00			

- f. Air Voids:
  - 1) Basis of evaluation is laboratory compacted samples (not field compacted samples).
  - 2) Air voids will be mix design target plus or minus one (1) percent.
  - If test results are not within this Section's limits, options include correction of production procedures or alternate mix design acceptable to Civil Engineer.
- D. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Asphalt Paving:
    - a. Deficient asphalt paving thickness:
      - 1) Place additional material over deficient areas. Do not skin patch. Mill for inlay if necessary. Correct deficient asphalt paving thickness at no additional cost to the Owner.
    - b. Rejection and Removal of Asphalt Paving:
      - 1) Remove asphalt paving found defective after installation and install acceptable product at no additional cost to the Owner.
    - c. Removal of Asphalt Paving:
      - 1) Remove spatter, over-coat, or mar at no additional cost to the Owner.

- 2) Remove asphalt from borrow pits or gutters at no additional cost to the Owner.
- d. Repair of Asphalt Paving:
  - 1) Repair or replace defective joints, seams, edges at no additional cost to the Owner.

# 3.5 PROTECTION

- A. Tack Coat:
  - 1. Protect all surfaces exposed to public view from being spattered or marred. Remove any spattering, over-coating, or marring at no additional cost to Owner.
  - 2. Traffic:
    - a. Do not permit traffic to travel over tacked surface until tack coat has cured and dried.
- B. Asphalt Paving:
  - 1. Protect hot mixed asphalt (HMA) pavement from traffic until mixture has cooled enough not to become marked.

# 3.6 CLEANING

- A. Waste Management:
  - 1. Pre-emergent herbicide:
    - a. Follow Manufacturer's recommendations for disposal of product at approved waste disposal facility.
      - 1) Do not reuse empty containers.

END OF SECTION

# SECTION 32 1723 PAVEMENT MARKINGS

# PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish acrylic paint and apply pavement and curb markings as described in Contract Documents including:

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. Federal Specifications and Standards:
    - a. FED-STD-595C, 'Federal Standard: Colors Used in Government Procurement' (16 Jan 2008).
    - b. FED TT-P-1952F, 'Paint, Traffic and Airfield Marking, Waterborne' (17 Feb 2015).
  - 2. U.S. Department of Transportation Federal Highway Administration:
    - a. FHWA MUTCD-10, 'Manual on Uniform Traffic Control Devices'.

# 1.3 SUBMITTALLS

- A. Action Submittal:
  - 1. Product Data:
    - 1) Manufacturer's published product data and certification that product supplied meets requirements of this specification.
- B. Informational Submittal:
  - 1. Test And Evaluation Reports:
    - a. Acrylic Paint:
      - 1) Provide reports showing compliance to FED TT-P-1952F.
- C. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's Documentation:
        - a) Product data.
        - b) Specification compliance documentation.
      - 2) Testing and Inspection Reports:
        - a) Reports showing compliance.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Paint must meet requirements of FED TT-P-1952-F and local regulations for VOC.
  - 2. Paint handicap spaces to conform to ADA Standards and local code requirements.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened containers with labels intact.
    - a. Labels to include:
      - 1) Manufacturer's name and address.
      - 2) TT-P-1952F reference.
      - 3) Classification Type.

- 4) Color.
- B. Storage And Handling Requirements:
  - 1. Follow Manufacturer's storage and handling requirements.
  - 2. Protect stored material from freezing at temperatures above 35 deg For above 115 deg F.
  - Do not invert or roll containers.

# 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Acrylic Paint:
    - a. Apply only on dry clean surfaces, during favorable weather (not excessively windy, dusty, or foggy), and when damage by rain, fog, or condensation not anticipated.
    - b. Paving surface and Ambient temperature shall be minimum 50 deg F and rising.
    - c. Temperature shall not drop below 50 deg F within twenty four (24) hour period following application.
    - d. Acetone based paints that are one hundred (100) percent acrylic shall not drop below 32 deg F within twenty four (24) hour period following application.

#### PART 2 - PRODUCTS

# 2.1 MATERIAL

- A. Acrylic Paint:
  - 1. Description:
    - a. Low VOC, ready-mixed, one- component, acrylic waterborne traffic marking paint suitable for application on concrete, asphalt, sealers, and previously painted areas of these surfaces.
  - 2. Design Criteria:
    - a. General:
      - 1) Traffic Paint.
      - Non-volatile portion of vehicle for all classification types shall be composed of one hundred (100) percent acrylic.
      - 3) Meet FED TT-P-1952F specification requirements.
      - 4) Fast drying when applied at ambient conditions requirement.
      - 5) Low VOC.
      - 6) Non-Reflectorized.
      - 7) Traffic paints not intended for use as floor paints. Do not use on pedestrian walkways or large surfaces such as ramps, floors and stairs which may become slippery when wet.
    - b. Classification:
      - 1) Type I for use under normal conditions.
    - c. Composition:
      - Non-volatile portion for all types shall be composed of one hundred (100) percent acrylic polymer as determined by infrared spectral analysis.
      - 2) Prohibited material:
        - Product does not contain mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolysable chlorine derivatives, ethylene-based glycol ethers and their acetates, nor any carcinogen.
    - d. Qualitative Requirements:
      - 1) Meet FED TT-P-1952F requirements for:
        - a) Abrasion resistance.
        - b) Accelerated package stability.
        - c) Accelerated weathering.
        - d) Appearance.
        - e) Color requirements:
          - (1) Color Match (all colors except white and yellow).
          - (2) Daylight directional reflectance.
          - (3) Yellow color match.
        - f) Condition in container.
        - g) Dry-through (early washout) for Type II only.

- h) Flexibility.
- i) Freeze/thaw stability.
- j) Heat-shear stability.
- k) Scrub resistance.
- I) Skinning.
- m) Titanium dioxide content.
- n) Water resistance.
- e. Quantitative requirements:
  - 1) Meet FED TT-P-1952F requirements (Table 1).
  - 2) Acetone based paints that are one hundred (100) percent acrylic and have exempt status under Federal law are exempt from meeting FED TT-P-1925F requirements.
- Colors:
  - a. General:
    - Traffic Paint will be furnished in white and any Federal Standard 595 color in accordance to FED-STD-595C:
      - a) Yellow: 33538.
      - b) Blue: 35180.
  - b. Yellow:
    - 1) Lane lines, edge lines, transverse lines, arrows, words, symbol markings, speed bump markings, parking space markings, safety markings.
  - c. Blue And White:
    - 1) In parking spaces specifically designated as reserved for disabled.
- 4. Type Two Acceptable Products:
  - a. Any product meeting design criteria of this specification as approved by Architect/Owner's Representative before application. See Section 01 6200.

#### PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Acrylic Paint:
  - 1. Asphalt Surfaces:
    - a. Do not apply paint until asphalt has cooled.
    - b. Allow new seal coated surfaces to cure for at least twenty four (24) hours before applying paint.
- B. Surfaces shall be dry and free of grease and loose dirt particles.
- C. Perform layout with chalk or lumber crayon only.

#### 3.2 APPLICATION

- A. General:
  - 1. Mix in accordance and apply as per Manufacturer's instructions.
  - 2. Apply at locations and to dimensions and spacing as shown on Contract Drawings.
- B. Tolerances:
  - 1. General: Make lines parallel, evenly spaced, and with sharply defined edges.
  - Line Widths
    - a. Plus or minus 1/4 inch variance on straight segments.
    - b. Plus or minus 1/2 inch variance on curved alignments.
- C. Coverage:
  - 1. Paint stripes added to new asphalt and concrete surfaces:
    - a. Apply single coat.
  - 2. Apply traffic paint at rate of 13 to 15 mils minimum wet thickness, 8 to 9 mils dry thickness. Application at more than 15 mils may result in extended dry times and may cause lifting or cracking on some asphalt surfaces.

## 3.3 FIELD QUALITY CONTROL

## A. Non-Conforming Work:

1. Replace or correct defective material not conforming to requirements of this specification or any work performed that is of inferior quality at no cost to Owner.

## 3.4 CLEANING

## A. General:

1. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect/Owner's Representative before performance.

## B. Waste Management:

1. Remove debris resulting from work of this Section. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

END OF SECTION

PAVEMENT MARKING - 4 - 32 1723

# SECTION 32 3113 CHAIN LINK FENCES AND GATES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete chain link fence as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for mow strips at fencing and setting sleeves in concrete retaining walls.
  - 2. Section 05 0503: 'Shop-Applied Metal Coatings' for priming and galvanizing repair.
  - 3. Section 05 0523: 'Metal Fastening' for welding requirements.

#### 1.2 REFERENCES

- A. Association Publications: / Organizations:
  - 1. Chain Link Fence Manufacturers Institute (CLFMI), Columbia, MD www.chainlinkinfo.org,
    - WLG 2445, 'Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing' (2012)
    - b. CLF-SFR0111, 'Chain Link Fence Manufacturers Institute Security Fencing Recommendations'.
    - c. CLF-PM0610, 'Field Inspection Guide'.
    - d. CLF-TP0211, 'Tested and Proven Performance of Security Grade Chain Link Fencing Systems'.
- B. Reference Standards:
  - ASTM International:
    - a. ASTM A123/A123M-15, 'Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products'.
    - b. ASTM A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - c. ASTM A392-11a, 'Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric'.'
    - d. ASTM A1011/A1011M-15, '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'.
    - e. ASTM C1107/C1107M-13, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.
    - f. ASTM F1043-17, 'Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework'.
    - g. ASTM F1083-16, 'Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures'.
    - h. ASTM F3000/F3000M-13, 'Standard Specification for Polymer Privacy Insert Slats for Chain Link Fabric and Privacy Chain Link Fabric Manufactured Containing Pre-Installed Privacy Slats'.

## 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data: Manufacturer literature or cut sheets on fence components.
  - 2. Samples: Types of vision slats and colors for Architect's selection.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Vision Slats:
        - a) Final, executed copy of Warranty.

## 1.4 WARRANTY

#### A. Vision Slats:

1. Manufacturers twenty-five (25) year, pro-rata limited Warranty.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

#### . Materials:

- Fabric:
  - a. Chain Link Fabric of 9 ga wire, galvanized before or after weaving with 1.2 ounce zinc coating conforming to requirements of ASTM A392, Class I.
  - b. Mesh:
    - 1) With Visual Privacy / Security Slats:
      - a) 2 inch square mesh required by specified vision slat.
  - c. Knuckle both selvages.
- 2. Framework:
  - Posts and Rails shall be roll-formed, self-draining shapes meeting strength requirements of ASTM F1043, Table 3, and with 2 ounce (56.7 grams zinc coating per 1 sq ft of surface area conforming to ASTM A123/A123M.
  - b. Line Posts:
    - 1) Line Posts 8 feet and under:
      - 2.375 inch outside diameter Schedule 40 tubular section weighing 3.65 lbs per lineal 1 ft meeting requirements of ASTM F1083.
      - 2.375 inch outside diameter Schedule 40 tubular section weighing 3.12 lbs per lineal 1 ft formed from steel meeting requirements of ASTM A1011/A1011M.
  - c. Terminal Posts:
    - 3 inch outside diameter Schedule 40 pipe weighing 5.79 lbs per lineal 1 ft meeting requirements of ASTM F1083.
    - 2) 3 inch outside diameter Schedule 40 tubular section weighing 4.64 lbs per lineal 1 ft formed from steel meeting requirements of ASTM A1011/A1011M.
  - d. Top And Brace Rail:
    - 1) 1.660 inch outside diameter Schedule 40 pipe weighing 2.27 lbs per lineal 1 ft meeting requirements of ASTM F1083.
    - 2) 1.660 inch outside diameter Schedule 40 tubular section weighing 1.84 lbs per lineal 1 ft formed from steel meeting requirements of ASTM A1011/A1011M.
  - e. Fittings:
    - 1) Pressed steel or malleable iron, hot-dip galvanized conforming to ASTM A153/A153M.
    - 2) Tie wires shall be 12 ga minimum galvanized steel or 9 ga minimum aluminum wire.
  - f. Tension Wire: 7 ga minimum galvanized spring steel.

#### B. Mixes:

- 1. Post Foundation Concrete:
  - a. One cu ft cement, 2 cu ft sand, 4 cu ft gravel, and 5 gallons minimum to 6 gallons maximum water.
  - b. Mix thoroughly before placing.

# 2.2 ACCESSORIES

- A. Vision Slats:
  - 1. Manufacturer Contact List:
    - a. PrivacyLink, Hyde Park, UT www.eprivacylink.com.
  - 2. Description:
    - a. High-density polyethylene (HDPE), double-walled, self-locking or with locking feature that prevents slats from being removed
  - 3. Design Criteria:
    - a. Provide slats with ultra violet (UV) inhibitors.

- 4. Visual Privacy / Security:
  - a. Semi Privacy:
    - 1) Description:
      - a) When installed, slats will provide 75 percent minimum visual privacy/security.
      - o) Mesh: 2 inch x 2 inch
    - 2) Type Two Acceptable Product:
      - a) Noodle Link by PrivacyLink.
      - b) Equal as approved by Architect before installation. See Section 01 6200.
- 5. Color:
  - a. Slats:
    - 1) As selected by Architect from Manufacturer's standard colors.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Fence shall be installed by mechanics skilled and experienced in erecting fences of this type and in accordance with Contract Documents.
  - 1. When general ground contour is to be followed, make changes of grade in gradual, rolling manner.
  - 2. Evenly space posts in line of fence a maximum of 10 feet center to center.
- B. Post Foundations:
  - 1. Set posts with concrete post foundations as specified below:
    - a. Line Posts:
      - 1) Diameter 8 inch
      - 2) Depth 36 inch.
    - o. End And Corner Posts:
      - 1) Diameter 12 inch
      - 2) Depth 42 inch.
    - c. At mow strips, set top of post foundation below grade sufficient to allow for placing of mow strip. Measure post foundation depth from top of mow strip.
    - d. Where fences are incorporated into slabs, measure post foundation depth from top of slab. Extend bottom of slab footing sufficient to allow specified amount of concrete around post.

### C. Fence:

- 1. After posts have been permanently positioned and concrete cured for one (1) week minimum, install framework, braces, and top rail. Join top rail with 6 inch minimum couplings at not more than 21 foot centers.
- 2. Stretch fabric by attaching one end to terminal post and supplying sufficient tension to other end of stretch so slack is removed.
  - a. Fasten fabric to line posts with tie wires. Pass ties over one strand of fabric and hook under line post flange.
  - b. Place one tie as close to bottom of fabric as is possible with additional ties equally spaced between top and bottom band on approximately equal spacing not to exceed 14 inches on center.
  - c. Attach fabric to roll formed terminals by weaving fabric into integral lock loops formed in post. Attach fabric to tubular terminals with tension bars and bands.
  - d. Hold fabric approximately 2 inches above finish grade line.
  - e. On top rail, space tie wires at no more than 24 inches on center.
  - f. Securely attach fittings and firmly tighten nuts.

# 3.2 CLEANING

A. Spread dirt from foundation excavations evenly around surrounding area unless otherwise directed. Leave area free of excess dribbles of concrete, pieces of wire, and other scrap materials.

## END OF SECTION

# SECTION 32 8423 UNDERGROUND SPRINKLERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - Furnish and install planting irrigation system as described in Contract Documents complete with accessories necessary for proper function.
- B. Related Requirements:
  - 1. Section 01 4301: 'Quality Assurance Qualifications'.
  - 2. Section 22 1116: 'Domestic Water Piping' for stop and waste valve.
  - 3. Section 31 2213: 'Rough Grading'.
  - 4. Section 31 2216: 'Fine Grading'.
  - 5. Section 31 2316: 'Excavation'.
  - 6. Section 31 2323: 'Fill' for trench compaction.
  - 7. Section 32 9001: 'Common Planting Requirements'.
    - a. Pre-installation conference held jointly with other common planting related sections.
  - B. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
  - 9. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on Topsoil Testing Report).
  - 10. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.
  - 11. Section 32 9219: 'Seeding'.
  - 12. Section 32 9223: 'Sodding'.
  - 13. Section 32 9300: 'Plants'.
  - 14. Division 26: Power to controller.

## 1.2 REFERENCES

## A. Definitions

- 1. Automated Self Flushing Filter: Filter located immediately downstream from point of connection in-lieu of backflow prevention device for irrigation systems that utilize non-potable, secondary and/or reclaimed water that is automatically self flushing to control unwanted debris from infiltrating remaining irrigation system.
- 2. Dielectric Fittings: Special type of fitting used between dissimilar metals to prevent galvanic action from causing corrosion failure.
- 3. High Wind Area: As defined in this specification, area with average sustained wind speed of over 7.5 mph (12 km/hr).
- 4. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- 5. Landscape Management Plan (LMP): See Section 32 9001 for definition.
- 6. Lateral Line: Downstream from electric control valves to pop-up spray heads and drip valve assemblies to emitters. Piping or tubing is under pressure during flow. In areas where potable or secondary water are used, pressure supply line shall be white. In areas where non-potable or reclaimed water are used, pressure supply line shall be purple.
- 7. Main Line: Downstream from point of connection to electric control valves. Piping is under water-distribution-system pressure when activated by master valve or hydrometer. In areas where potable or secondary water are used, pressure supply line shall be white. In areas where non-potable or reclaimed water are used, pressure supply line shall be purple.
- 8. Peak Flow: Maximum required flow for given month based on six (6) day week, nine (9) hour day watering window to be used for irrigation system design and to be used in hydraulic analysis.
- 9. Plant Establishment Period: See Section 32 9001 for definition.
- 10. Point of Connection: Location where meter for irrigation system is located.
- 11. Smart Controller: Irrigation clocks that automatically adjust irrigation run times in response to environmental changes using sensors and weather information to manage watering times and frequency. As environmental conditions vary, controller will increase or decrease irrigation. Smart controllers have ability to turn off sprinklers automatically during rain, high wind or low temperature.
- 12. Static Water Pressure: Pressure at point of connection when system is not operable.
- 13. Source Pressure Test: Test to determine water source pressure.

- 14. System Pressure Test: Test to evaluate system when pressurized.
- 15. Two Wire Path: Conducts power to solenoid valves, and also conducts communications signals from Controller to each device on system. Sensors receive instructions to take readings, transmit data and perform other tasks; solenoid valves and other devices also receive commands from controller over same wires used to carry power to valves.
- 16. Working Pressure: Pressure at point of connection when system is operable.

#### B. Reference Standards:

- 1. ASTM International:
  - ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
  - b. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.

## 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

- 1. Provide Coordination for required tests and inspections as described under Field Quality Control in Part 3 EXECUTION for following:
  - a. Manufacturer's Field Service: Provide necessary manufacturer's field service.
  - b. Pressure Test: In presence of Landscape Architect or designated Representative(s), provide pressure test.
  - c. Substantial Completion Walkthrough: In presence of Landscape Architect or designated Representative(s), plan and provide walk through after completion of irrigation system.
  - d. Irrigation Final Acceptance: In presence of Landscape Architect or designated Representative(s), plan and provide final walk through after completion of all work listed on Substantial Completion walk through list provided by Landscape Architect.

#### B. Pre-Installation Conference:

- 1. Participate in pre-installation conference as specified in Section 32 9001.
  - Irrigation Subcontractor's Representative and Foreman responsible for installation of irrigation system required to be in attendance.
  - b. Schedule pre-installation conference before irrigation system installation begins.
  - c. In addition to agenda items specified in Section 01 3100, review following:
    - 1) Review mockup requirements.
    - 2) Review required tests and inspections and submittal requirements.
    - 3) Review smart controller and submittal requirements.
    - 4) Review Attachment 'Smart Controller Installation Checklist' in this specification.
    - 5) Review Landscape Management Plan (LMP) requirements.

## C. Sequencing:

1. Install sleeves before installation of cast-in-place concrete site elements and paving.

## 1.4 SUBMITTALS

## A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's cut sheets for each element of system.

#### B. Informational Submittals:

- 1. Certificates:
  - a. Irrigation System Acceptance:
    - 1) Upon acceptance of irrigation system, Landscape Architect will provide signed certificate:
      - Certificate will include name and signature of Landscape Architect, Landscape Architect's company, Landscape Architect's telephone number, and date of review.
      - Certificate will state to best of Landscape Architect's knowledge that the system is in full compliance with Contract Documents.
  - b. Establishment Period Acknowledgement (coordinate with 32 9000 sections):
    - 1) Establishment Period begins at date of Substantial Completion. Landscape Architect will provide certificate acknowledging Establishment Period commencement:

- Certificate will include name and signature of Installer, Installer's company, Installer's telephone number, and date.
- b) Certificate will include name and signature of Owner's Representative, Owner's Representative Group name, Owner's Representative Group telephone number, and date.
- Certificate will acknowledge date when Establishment Period begins and that it extends one (1) year from that time.
- c. Training Acknowledgement:
  - Landscape Architect will provide certificate acknowledging training has been performed:
    - Certificate will include name and signature of Installer, Installer's company, Installer's telephone number, and date.
    - b) Certificate will include name and signature of Owner's Representative, Owner's Representative Group name, Owner's Representative Group telephone number, and date.
    - Certificate will acknowledge Owner's Representative has been trained in operation and maintenance of system.
    - Certificate will acknowledge Owner's Representative has been trained in the operation and the smart controller.
- 2. Test And Evaluation Reports:
  - a. Provide report for results of main line service pressure testing before burial of mainline.
  - b. Provide following from Main Line Irrigation test and observation:
    - Record and submit documentation of Irrigation Main Line tests, issues, and measure taken to correct problems.
- 3. Manufacturer Instructions:
  - a. Manufacturer's printed literature on operation and maintenance of operating elements of system.
  - b. Instruction Manual:
    - Complete system operation and maintenance directions, including winterizing, controller program worksheet, and irrigation scheduling based on local site specific conditions.
    - 2) Provide plant establishment schedule and long term maintenance establishment schedule.
- 4. Special Procedure Submittals:
  - a. Manufacturer's Smart Controller Approved Installer:
    - Complete Irrisoft 'Weather Reach Controller Link 'Smart Controller Installation Checklist' and send to Manufacturer. Receive 'Manufacturer's Operational Report'.
    - 2) Signed 'Smart Controller Installation Checklist' to be included in Closeout Submittals.
    - 3) 'Manufacturer's Operational Report' to be included in Closeout Submittals.
- 5. Qualification Submittals:
  - a. Irrigation Subcontractor:
    - 1) Provide documentation if requested by Architect.
  - b. Irrigation Installer:
    - 1) Provide documentation if requested by Architect.
  - c. Smart Controller Installer:
    - 1) Provide documentation if requested by Architect.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Submittal Format: Digital format only.
    - b. Maintenance Contracts:
      - 1) Smart Controller:
        - a) Weather Reach:
          - (1) One (1) year Weather Reach Access Subscription.
        - b) HydroPoint Weather TRAK:
          - (1) One (1) year ET subscription.
        - c) Rain Master Eagle Plus:
          - (1) Two (2) years wireless communication fees and internet service.
    - c. Operations And Maintenance Data:
      - 1) Include additional copy for Landscape Management Plan (LMP) of the following information:
        - a) Provide irrigation system operation and maintenance recommendations.
        - b) Provide irrigation system operation and maintenance recommendations from manufacturers.
        - c) Provide irrigation system winterization instructions.
        - d) Provide plant establishment period watering schedule.
        - e) Provide post plant establishment period watering schedule.
    - d. Warranty Documentation (include additional copy for Landscape Management Plan (LMP):
      - 1) Irrigation System Warranty.
      - 2) Manufacturer's extended Warranty for smart controller.
    - e. Record Documentation:
      - 1) Provide manufacturer's printed literature and cut sheets for each element of system.

- 2) Certificates:
  - a) Irrigation System Acceptance.
  - b) Establishment Period Acknowledgement.
  - c) Training Acknowledgement.
- 3) Testing and Inspection Reports:
  - a) Pressure Test.
  - b) Completed Irrisoft Weather Reach Controller Link 'Manufacturer's Operational Report' and a listing of how Installer resolved any problems.
  - c) Completed 'Smart Controller Installation Checklist'.
- 4) Irrigation Record Drawings. As installation occurs, prepare accurate record drawing to be submitted before final inspection, including:
  - a) Detail and dimension changes made during construction. Record at time of installation.
  - b) Significant details and dimensions not shown in original Contract Documents.
  - c) Field dimensioned locations of valve boxes, manual drains, quick-coupler valves, control wire runs not in mainline ditch, soil moisture sensors (if soil moisture sensor technology is selected for site) and both ends of sleeves.
  - d) Take dimensions from permanent constructed surfaces or edges located at or above finish grade.
  - e) Take and record dimensions at time of installation.
- 5) Photographs: Provide photographs prior to burial of key elements including but not limited to:
  - a) Valves.
  - b) Drains.
  - c) Hydrometers.
- 2. Irrigation Drawings:
  - a. Irrigation Plan:
    - 1) Laminated reduced size:
      - a) Size: 11 by 17 inches (275 by 425 mm).
        - b) Show color key circuits and laminated both sides with 5 mil thick or heavier plastic.
        - c) Mount on 12 x 18 inch (300 by 450 mm) hard board drilled with two (2) 1/2 inch (13 mm) holes at top of board.
        - d) Hang on hooks in Custodial Room or location designated by Owner's Representative.
    - 2) Un-Laminated reduced size to be included in Landscape Management Plan (LMP):
      - a) Size: 11 by 17 inches (275 by 425 mm).
      - b) Show color key circuits.
- 3. Landscape Management Plan (LMP):
  - a. Submittal Format: Digital format and hard copy of each:
    - 1) Irrigation Section: Include additional copies included in Operations and Maintenance Manual of following:
      - a) Provide irrigation system operation and maintenance recommendations.
      - b) Provide irrigation system operation and maintenance recommendations from manufacturers.
      - c) Provide irrigation system winterization instructions.
      - d) Provide plant establishment period watering schedule.
      - e) Provide post plant establishment period watering schedule.
      - f) Provide Warranty Documentation: Irrigation System Warranty and Manufacturer's extended Warranty for smart controller.
      - g) Provide Un-Laminated, Reduced Size Irrigation Plan.
- Final payment for system will not be authorized until Closeout Submittals are received and accepted by Architect and Landscape Architect.
- D. Maintenance Material Submittals:
  - 1. Tools:
    - a. Furnish following items before Final Closeout Review:
      - 1) One (1) heavy-duty key for stop and waste or main shut-off valve.
      - 2) One (1) quick coupler key with brass hose swivel.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. General:
    - a. Work and materials shall be in accordance with latest rules and regulations, and other applicable state or local laws.
    - b. Nothing in Contract Documents is to be construed to permit work not conforming to these codes.

- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Irrigation Subcontractor:
    - a. Company specializing in performing work of this section.
    - b. Minimum five (5) years experience in irrigation sprinkler installations.
    - c. Minimum five (5) satisfactorily completed irrigation sprinkler installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - d. Use trained personnel familiar with required irrigation sprinkler procedures and with Contract Documents.
    - e. Foreman or supervisor required to attend pre-installation conference.
    - f. Agree to use only approved installers for smart controller technology.
    - g. Upon request, submit documentation.
  - 2. Irrigation Installer:
    - a. Perform installation under direction of foreman or supervisor.
    - b. Minimum three (3) years experience in irrigation sprinkler installations similar in size, scope, and complexity.
    - c. Upon request, submit documentation.
  - Smart Controller Installer:
    - a. Approved installer familiar with required irrigation system and smart controller installation procedures:
      - 1) Agree to follow requirements as described under Installers in PART 3 EXECUTION.
      - 2) Agree to complete reporting documents.
      - 3) Agree to instruct Owner's designated personnel in complete operation and maintenance of smart controller.
      - 4) Agree to assist Landscape Architect in completing Watering Schedule for Landscape Management Plan (LMP).

## C. Mockups:

- Provide Mockups of each detail within valve box at staging area for review by Landscape Architect prior to installation of irrigation system.
- 2. These mockups may be installed with or without solvent weld cement so that they can later be used in field.
- 3. Mockups shall include complete installation including weed barrier fabric, gravel sump, equipment assembly, and valve box placement and branding in conformance with these specifications.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Protect materials from damage and prolonged exposure to sunlight.

#### 1.7 WARRANTY

- A. Warranty:
  - 1. Irrigation System:
    - a. Warranty irrigation system for period of one (1) year from date of Final Acceptance. As part of warranty, Installer shall perform following:
      - 1) Filling and repairing depressions and replacing plantings due to settlement of irrigation system trenches.
      - 2) Repairing faulty equipment, wiring and pipe installations.
      - 3) Repairing equipment and pipe not properly winterized.
  - 2. Smart Controller:
    - Provide Manufacturer's extended warranty for two (2) years to be free of design, materials and workmanship defects.

## PART 2 - PRODUCTS

## 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. 3M, Austin, TX www.3m.com/elpd.
      - b. Action Machining Inc, Bountiful, UT www.actionfilters.com.
      - c. Amiad www.amiadusa.com.
      - d. Apollo Valves by Conbraco Industries, Matthews, NC www.apollovalves.com.

- e. Carson Industries LLC, Glendora, CA www.carsonind.com.
- f. GPH Irrigation Products, Fontana, CA www.gphirrigation.com.
- g. Harrington Corporation (Harco), Lynchburg, VA www.harcofittings.com.
- h. Hunter Industries, San Marcos, CA www.hunterindustries.com.
- i. HydroRain, North Salt Lake, UT www.hydrorain.com.
- j. King Innovation, St Charles, MO www.kinginovation.com.
- k. IPS Corporation, Compton, CA www.ipscorp.com.
- I. Irrisoft, Inc. North Logan, UT www.weatherreach.com.
- m. Leemco, Colton, CA www.leemco.com.
- n. Netafim, Inc. www.netafimusa.com.
- o. Nibco Inc, Elkhart, IN www.nibco.com.
- p. Northstar Industries, LLC, Methuen MA www.northstarind.com.
- g. Orbit Irrigation Products, Inc. Bountiful, UT www.orbitonline.com.
- r. Paige Electric, Union, NJ www.paigewire.com.
- s. Rain Bird Sprinkler Manufacturing Corp, Glendora, CA www.rainbird.com.
- t. Salco by Weathermatic Irrigation Products, Garland, TX www.weathermatic.com.
- u. Toro Company, Irrigation Div, Riverside, CA www.toro.com.
- v. T. Christy Enterprises, Inc. (Christy's), Anaheim, CA www.tchristy.com.
- w. VAF Filtration Systems, Arvada, CO www.vafusa.com.
- x. Weathermatic Irrigation Products, Garland, TX www.weathermatic.com.
- y. Wilkins a Zurn Company, Paso Robles, CA www.zurn.com.
- B. Category Three National Account Approved Manufacturer. See Section 01 6200 for definitions of Categories:
  - 1. Design Criteria:
    - a. Provide smart controller and all components from same Approved Manufacturer only.
  - 2. Irrisoft, Inc., North Logan, UT www.weatherreach.com.
    - a. Approved Distributor Contact Information:
      - 1) First Contact:
        - a) Steven Moore, (office) (435) 755-0400 (cell) (435) 770-3896 smoore@irrisoft.net.
      - 2) Second Contact:
        - a) Paul Urzagaste, (office) (435) 755-0400 (cell) (435) 754-6737 paulu@weatherreach.com.

#### C. Materials:

- 1. Rock-Free Soil:
  - a. For use as backfill around PVC pipe.
- 2. Native Material:
  - a. Soil having rocks no larger than 1/2 inch (13 mm) in any dimension.
- 3. Pea Gravel:
  - a. For use around drains, valves, and quick couplers.
  - b. 1/2 inch (13 mm) maximum dimension, washed rock.
- 4. Sand: Fine granular material naturally produced by rock disintegration and free from organic material, mica, loam, clay, and other deleterious substances.
- 5. Native Material: Soil native to project site free of wood and other deleterious materials and rocks over 1-1/2 inches (38 mm).
- 6. Topsoil:
  - a. Use soil as described in Section 32 9120, Section 32 9121, and Section 32 9122.
  - b. Achieve depths as described in Section 32 9122.
- 7. Pipe, Pipe Fittings, And Connections:
  - a. General:
    - 1) Pipe shall be continuously and permanently marked with Manufacturer's name, size, schedule, type, and working pressure.
    - 2) Pipe sizes shown on Contract Drawings are minimum. Larger sizes may be substituted at no additional cost to Owner.
  - b. Piping:
    - 1) Main Line: Schedule 40 PVC.
    - 2) Lateral Lines: Schedule 40 PVC.
    - 3) Backflow Assembly Piping: Galvanized steel.
    - 4) Quick Coupler Piping: Galvanized steel.
  - c. Fittings: Same material as pipe, except where detailed otherwise.
    - 1) Fittings 3 inch (76 mm) or larger: Harco or Leemco of matching size.
    - 2) Use dielectric union fittings between dissimilar metal pipes and fittings.
  - d. Sleeves:
    - 1) Under Parking Area And Driveway Paving: Schedule 40 PVC Pipe.

- 2) All Other: Class 200 PVC Pipe.
- 3) Sleeve diameter shall be two (2) times larger than pipe installed in sleeve.

#### 8. Sprinkler Heads:

- a. Each type of head shall be product of single manufacturer.
- b. Shrub Head Bubblers:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: 2, 4, 6 Short Radius, S-8A, S-16A series (stream spray), PCN, PCB, MSBN, AFB, 5-CST-B series.
    - b) Rainbird: 1400 series pressure compensating.
    - c) Weathermatic: 102 Series, 106 series.
- c. Spray Heads in Shrub and Ground Cover Areas:
  - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - Hunter: PR30 or shrub adapter on Schedule 80 PVC nipple. Supply with MPR nozzles. CV optional.
    - b) Hydro-Rain: 200 series, 04, 06, 12 Model PRHS with shrub adapter No. 94525.
    - Rainbird: 1804, 1806, or 1812 PRS Series or PA-8S shrub adapter. Supply with MPR, U-series, or HE-VAN series nozzles. SAM optional.
    - d) Toro: 570 ZPRX MPR series with shrub adapter and MPR plus or Precision Series Spray nozzles.
    - e) Weathermatic: LX4 or LX6 series or LXS (shrub adapter). Supply with MPR nozzle.
- d. Spray Heads in Lawn Areas:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: PRS30, Pro-Spray Series with MPR nozzles, optional with CV.
    - b) Hydro-Rain: HRS 200 Series, 04, 06 Model PRHS with MPR nozzle.
    - c) Rainbird: 1804 or 1806 Series with MPR, U-Series, or HE-VAN nozzles. SAM optional.
    - d) Toro: 570 ZPRX series with MPR plus or Precision Series Spray nozzles.
    - e) Weathermatic: LX4 or LX6 series with MPR nozzles.
- e. Rotary Stream Heads in Lawn and Shrub Areas:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: PRS40 with MP Rotator nozzle.
    - b) Rainbird: 1806-SAM-P45 with R13-18 or R17-24 nozzles.
    - c) Toro: 570 ZPRX Series with Precision Series Rotating nozzles.
- f. Rotor Pop-ups:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - Hunter: PGS Series (Shrub), PGP Series (17 to 46 feet), I-10 Series (Shrub) I-20 Series (17 to 46 feet), I-25 or I-40 Series (40 to 76 feet).
    - b) Rainbird: 5000/5000 plus MPR series, (25'-35'), 5500 Series (33'-55') 8005 Series (39'-81').
    - c) Toro: Mini 8 series (20-35 feet), Super 800 (28'-50') series with 5 inch pop.
    - d) Weathermatic: T3 (23'-61'), CT-70 series, (49'-74').
- 9. Sprinkler Risers:
  - a. Spray Heads (Pre-Manufactured Swing Assemblies):
    - 1) Type Two Acceptable Products:
      - a) Hunter: SJ-512 (12 inch (305 mm) x 1/2 inch (12.7 mm)) thread) or SJ-7512 (12 inch (305 mm) x 3/4 inch (19 mm) x 1/2 inch (12.7 mm)) thread).
      - b) Rain Bird model SA125050.
      - c) Hydrorain: Blu-lock model BLJ-050-MC-1..
      - d) Equal as approved by Architect before use. See Section 01 6200.
  - b. Spray Heads (Field Manufactured Assemblies:
    - Three (3) schedule 40 street ells or Marlex street ells connected to lateral tee to form an adjustable riser or pop-up riser as detailed.
    - 2) Risers for sprinkler heads 14 inches (355 mm) long minimum and 24 inches (610 mm) maximum.
      - a) Type Two Acceptable Products:
        - (1) Hunter: FLEXsg tubing with HSBE spiral barbed fittings.
        - (2) Hydro-Rain: Blu-lock Swing pipe & fittings.
        - (3) Rainbird: Swing Pipe with barbed fittings.
        - (4) Toro: Super Funny Pipe with barbed fittings, SPFA-5125, SPFA-51275.
        - (5) Equal as approved by Architect before installation. See Section 01 6200.
  - c. Rotor Pop-Up Sprinklers (Pre-Manufactured Assemblies):
    - 1) Type Two Acceptable Products:
      - a) 3/4 inch (19 mm) rotor pop-up sprinklers shall have an adjustable pre-assembled swing assembly riser. Swing assemblies shall be 3/4 inch x 12 inch (19 mm x 300 mm) and shall be threaded both ends. Swing assemblies shall be:
        - (1) Blu-lock: Model BLJ-075-TT-12.
        - (2) Rain Bird: Model TSJ-12075.
        - (3) Hunter: SJ-712 12 inch (305 mm) thread.

- b) 1 inch (25 mm) inlet rotor pop-up sprinklers shall have an adjustable pre-assembled double swing joint riser. Swing joints shall be 1 inch x 12 inch (25 mm x 300 mm) and shall be threaded both ends. Swing joint riser shall be:
  - (1) Rain Bird: Model TSJ-12075.
- 2) Equal as approved by Architect before installation:
- d. Rotor Pop-Up Sprinkler Heads (Field Manufactured Assemblies):
  - 1) Pop-up rotor sprinkler heads shall have adjustable riser assembly, three (3) ell swing joint assembly, unless detailed otherwise on Contract Drawings:
    - a) These swing joint fittings shall be of schedule 40 PVC plastic and nipples schedule 80 gray PVC unless otherwise designated on Contract Drawings.
    - b) Horizontal nipple parallel to side of lateral line shall be 8 inches (200 mm) long minimum.
    - All other nipples on swing joint riser shall be of length required for proper installation of sprinkler heads.
- 10. Automatic Irrigation Controller And Control Wiring:
  - a. Automatic Controller:
    - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Hunter:
        - (1) 6 to 42 Stations: I-Core Series. Provide with optional metal case in areas needing more security.
  - b. Smart Controller:
    - 1) Category Three National Account Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Weather Reach Controller Link as manufacturer by Irrisoft, Inc.:
        - (1) Model: CLw.
        - (2) Description: Weather Reach Wi-Fi or Ethernet Controller Link.
        - (3) Durable, weather resistant cabinet for outdoor installation.
        - (4) All other components required for complete and operational system.
        - (1) Traditional Wiring:
          - (a) Model WTL-C-6-PL-F (6 stations or less).
          - (b) Model WTL-C-12-PL-F (12 stations or less).
          - (c) Model WTL-C-18-PL-F (18 stations or less).
          - (d) Model WTPRO3-C-xx-CWM (18 stations or more).
        - (2) Inspection of system.
        - (3) Vandal resistant powder coated steel finish suitable for either indoor or outdoor environments. Provide stainless steel where outdoor conditions require non-corrosive material.
        - (4) Wall mounted enclosure assembly.
        - (5) Key-Lock.
        - (6) Low Profile Antenna.
        - (7) Universal Radio remote interface.
        - (8) One (1) year ET subscription.
        - (9) On-site post-installation controller inspection and start-up by authorized service provider.
        - (10) Site consultation.
        - (11) All other components required for complete and operational system.
  - c. Automatic Rain Sensors (supplied by Approved Distributor or Approved Manufacturer):
    - Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Hunter: MINI-CLIK, RAIN-CLIK, WRC, WRFC (Do not use with WeatherTRAK system).
      - b) Hydro-Rain: HRC-100-RS-RF (wireless); HRC-100-RS-HW (wired).
      - c) Rainbird: RSD-BEx (w/bracket), WR2-RFC, WR2-RS.
      - d) Toro: TWRS (wireless).
      - e) Weather Reach Tipping Rain Gauge: Model WR-PRG (Description: Pronamic\*\*\* Tipping Rain Gauge (1mm/ tip) w/ 30' Cable & Mounting Bracket).
      - f) Weathermatic: 955 Rain Sense.
  - d. Control Wiring:
- (a) Weather TRAK ET PRO3 two-wire flow sensor decoder.
- a) Waterproof Wire Connectors:
  - (1) Control wire connections shall consist of properly-sized wire nut inserted in waterproof grease cap.
  - (2) Type Two Acceptable Products:
    - (a) Northstar Industries: Suresplice SK 14-12G.

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- (b) Equal as approved by Architect before installation. See Section 01 6200.
- b) Surge Protector:
  - (1) Provide components as required.
- c) Valve Box:
  - (1) Type Two Acceptable Products:
    - (a) Hydro-Rain: ProSeries: 10 inch (255 mm) VB 0910.

- (b) Carson Industries: 10 inch (255 mm) Model 0910.
- (c) Equal as approved by Architect before use. See Section 01 6200.
- d) Valve Box Support:
  - (1) Standard size fired clay paving bricks without holes.
- 2) Wiring:
  - a) Traditional control wire shall be UF-UL listed, color coded PE insulated copper conductor direct burial size 14. For wire runs exceeding 3,300 feet (1 005.84 meter), use 12 AWG wire. Do not use green color coded wire.
  - b) Aside from connectivity to automatic control valves, this material will be used to connect to master valve portion of hydrometer.
- c) .Communication:
  - d) Communication wire between controller and flow sensor portion of hydrometer to be Paige Electric PE-393. Run underground communication wire in gray electrical conduit:
    - (1) Class Two Quality Standards. See Section 01 6200:
      - (a) Paige Electric Cadweld Connection.
- 3) Waterproof Wire Connectors:
  - a) Control wire connections shall consist of properly-sized wire nut inserted in waterproof grease cap:
  - b) Type Two Acceptable Products:
  - c) Valve Box Support:
    - (1) DBY or DBR by 3M.
    - (2) 'One Step' 20111SP by King Innovation.
    - (3) DB 57905, 57505 by Orbit.
    - (4) Equal as approved by Architect before installation. See Section 01 6200.
- e. Conduit:
  - 1) Exterior applications or inside mechanical shed:
    - a) Galvanized IMC. Where in contact with earth or concrete, wrap galvanized IMC conduit and fittings completely with vinyl tape.
  - 2) In-ground: commercial grade grey conduit.
  - 3) Size conduit as follows:
  - 4) Traditional Wiring:

Galvanized IMC Conduit							
Wire Size (AWG)	Number of Wires						
14	7	13	22	32	47	67	
12	6	8	18	25	38	59	
Conduit Size	3/4 inch (19 mm)	1 inch (25 mm)	1 1/4 inch (32 mm)	1 1/2 inch (38 mm)	2 inch (50 mm)	2 1/2 inch (64 mm)	
	PVC Sch. 40 Conduit						
Wire Size (AWG)	Number of Wires						
14	6	11	20	29	43	61	
12	5	7	17	23	35	54	
Conduit Size	3/4 inch (19 mm)	1 inch (25 mm)	1 1/4 inch (32 mm)	1 1/2 inch (38 mm)	2 inch (50 mm)	2 1/2 inch (64 mm)	
	PVC Sch. 80 Conduit						

Wire Size (AWG)	Number of Wires					
14	5	9	17	24	39	55
12	4	6	14	19	32	49
Conduit Size	3/4 inch (19 mm)	1 inch (25 mm)	1 1/4 inch (32 mm)	1 1/2 inch (38 mm)	2 inch (50 mm)	2 1/2 inch (64 mm)

#### 11. Valves:

- a. Manual Drain Valves:
  - 1) Brass ball valve with 'T' handle on main lines and in valve boxes on lateral lines.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Apollo Valves: 78-621-01 Series ball valve, 3/4 inch (19 mm).
- b. Automatic Valves:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: PGV or ICV series. If required, provide with Accu-sync pressure regulator.
    - b) Hydro-Rain: HRB series.
    - Rainbird: DVFUU Series, PGA series, PEB series, PESB series. If required, provide with Accu-sync pressure regulator.
    - d) Toro: 252E Series.
    - e) Weathermatic: 21000 CR series, 11000 CR series.
- c. Isolation Valves:
  - 1) PVC ball valves, size to match pipe size (use in warm climates- eco-regions 8.2, 10.2, 11.0, 12.0, 13.0, 14.0, 15.0).
  - 2) Non-rising stem gate valve, size to match pipe size (use in cold, northern climates- eco-regions 1.0, 5.0, 6.0, 7.0, 9.1, 9.2, and 10.1).
  - 3) Class Two Quality Standards. See Section 01 6200:
    - a) Nibco: 4660T (warm climates).
    - b) Nibco: T-113 (cold, northern climates).
- d. Backflow Preventer:
  - 1) Theft Prevention Reduced Pressure Principle Assembly:
    - a) Design Criteria:
      - (1) Black fusion epoxy coating applied to exterior bronze surfaces of assembly to help deter theft.
    - b) Type Two Acceptable Products:
      - (1) Model 375B by Wilkins.
      - (2) Equals as approved by Architect before use. See Section 01 6200.
      - (1) Modify as required for local conditions.
  - 2) Enclosures:
    - a) Design Criteria:
      - (1) Commercial grade aluminum enclosure.
      - (2) Sufficient in size to allow ease of access of components.
      - (3) Lockable: Provide with pad lock approved by Facilities Manager.
      - (4) Insulated in freeze susceptible areas.
- e. Secondary Water Filter:

Purpose	Description	Micron
Irrigation	In-Line or On-Line Drip Emitters	100
	Foggers/Misters	80-130
	Microjets	130
	Microspinklers/MP Rotator	130
	Sprayheads, Gear and Rotor	300

- 1) Filter (Stand-Alone):
  - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Amiad: Electric Filter TAF750 or Hydraulic M100-750.
    - (2) Valve and Filter: Hydraulic V-200P.
- 2) Enclosures (For Stand-Alone Filter):

- a) Design Criteria:
  - (1) Commercial grade aluminum enclosure.
  - (2) Sufficient in size to allow ease of access of components.
  - (3) Insulated in freeze susceptible areas.
- f. Hydrometer:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Netafim:
      - (1) LHM15TG0053-MEL, LHM2TG0053-MEL (Photo Diode High Frequency (PDH) Register is required) for Weather Reach Controller Link.
- g. Pressure Reducing Valve:
  - 1) Culinary Water:
    - Make and model shown on Contract Drawings or as required by local codes.
  - 2) Secondary Water:
    - a) Type Two Acceptable Products:
      - (1) Netafim: quick acting pressure relief valve.
      - (2) Equals as approved by Architect before use. See Section 01 6200.
- h. Quick Coupling Valves and Keys:
  - ) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: HQ-33D Series with RC or with HK-33 and HSO swivel.
    - b) Orbit: 51029 with 51031 brass key.
    - c) Rainbird: 33DRC, 33DLRC, 33DK with SH-O swivel.
    - d) Toro: 470 Series with single lug key.
- 12. Valve Accessories:
  - a. Valve manifolds:
    - 1) Type Two Acceptable Products.
      - a) Action Machining: 1800 Series, Models 18001, 18001-1-5, and 18001-2.0, 1, 1-1/2, and 2 inch (25, 38, and 50 mm) sizes.
      - b) Hydro-Rain: HRM Series.
      - c) Equals as approved by Architect before use. See Section 01 6200.
  - b. Valve Boxes And Extensions:
    - Lid Colors:
      - a) Green: Lawn areas (potable and secondary water).
      - b) Tan: Bare soil and rock areas (potable and secondary water).
      - c) Purple: Reclaimed water.
    - 2) Type Two Acceptable Products:
      - a) Carson Industries:
        - (1) 12 Inch (300 mm) Model 1419-12.
        - (2) 10 Inch (255 mm) Model 0910.
      - b) Equal as approved by Architect before use. See Section 01 6200.
  - c. Valve ID tags:
    - 1) Type Two Acceptable Products:
      - a) Christy's: Stamped ID tag: 2.25"x2.7" yellow plastic tag with alpha-numeric labeling matching zone. Contact Christy's for local supplier.
      - b) Equal as approved by Architect before use. See Section 01 6200.
  - d. Valve Box Supports:
    - 1) Standard size fired clay paving bricks without holes.
    - 2) Standard size 6 inch x 8 inch x 16 inch (150 mm x 200 mm x 400 mm) CMU Block.
- 13. Drip System:
  - a. Drip Valve Assembly:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Hunter: PCZ 101 Series, ICZ 101 Series.
      - b) Netafim:
        - (1) Over 5 GPM: LVCZ10075-HF.
        - (2) Under 5 GPM: LVCZ10075-LF.
      - c) Rainbird:
        - (1) Over 15 GPM: XCZ-150-PRB-COM series (15-40 gpm). Does not include ball valve. Automatic valve will operate in some dirty water conditions.
        - (2) Over 0.3 GPM and below 20 GPM: XCZ-100-B COM series (0.3-20 gpm).
      - d) Toro:
        - (1) Over 8 GPM: DZK-700-1-MF.
        - (2) Under 8 GPM: DZK-700-1-LF.
  - b. Distribution Tubing (from lateral lines to emitter):
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) GPH: GPST IH Series, pre-assembled flexible riser w/fittings (size as required).

- b) Salco: IH Series, pre-assembled flexible riser with fittings (size as required).
- c) Rainbird: SPX swing pipe with barbed fittings.
- d) Hunter: SJ Series with barbed fittings.
- c. Drip Emitters:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) GPH: GPST-CV Series (2, 4, 6, 8, 10 gph emitters).
    - b) Rainbird: XBT Series and PCT Series (2, 5, 7, 10 gph emitters).
    - c) Salco: PST-CV Series (2, 4 gph emitters).
- d. Indicator Emitter:
  - .) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Tree drip indicator:
      - (1) Rainbird: XB-10PC with barbed fittings, DBC-025 diffuser cap, TS-025 stake, and XQ 1/4 inch (6.4 mm) tubing.
- e. Distribution Tubing (from lateral lines to in-line emitter tubing).
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Flexible polyethylene pipe.
- f. In-Line Emitter Tubing:
  - ) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Hunter: PLD Series air/vacuum relief valves, barb shut-off valves, and 17 mm barbed fittings.
    - p) Rainbird: XFCV or XFS drip line, 1/2 inch air relief valves, flush valves, and XF series insert fittings.
    - c) Netafim: Techline CV tubing, flush valves, and fittings.
- g. Valve Boxes and Extensions:
  - 1) Lid Colors:
    - a) Green: Lawn areas (potable and secondary water).
    - b) Tan: Bare soil and rock areas (potable and secondary water).
    - c) Purple: Reclaimed water.
  - 2) Type Two Acceptable Products:
    - a) Carson Industries.
      - (1) 15 inch (380 mm) Model 1320-15 Super Jumbo.
      - (2) 12 Inch (300 mm) Model 1220-12 Jumbo.
      - (3) 12 Inch (300 mm) Model 1419-12.
      - (4) 10 Inch (255 mm) Model 0910.
    - b) Equal as approved by Architect before use. See Section 01 6200.
- h. Valve ID Tags:
  - 1) Type Two Acceptable Products:
    - a) Christy's: Stamped ID tag: 2.25"x2.7" yellow plastic tag with alpha-numeric labeling matching zone. Contact Christy's for local supplier.
    - b) Equal as approved by Architect before use. See Section 01 6200.
- i. Valve Box Supports:
  - 1) Standard size fired clay paving bricks without holes.
  - 2) Standard size 6 inch x 8 inch x 16 inch (150 mm x 200 mm x 400 mm) CMU Block.
- 14. Solvent Cement:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Primer:
      - a) Meet ASTM F656 standard and applicable sections of latest edition of 'Uniform Plumbing Code'.
      - b) Meet NSF/ANSI standard for use on potable water applications.
      - c) Low VOC emissions and compliant with LEED.
      - d) Product: Weld-On P-70 primer by IPS.
    - 2) PVC Solvent Cement:
      - a) Heavy bodied, medium setting, high strength:
        - Meet ASTM D2564 standard and applicable sections of latest edition of 'Uniform Plumbing Code'
        - (2) Meet NSF/ANSI standard for use on potable water applications.
        - (3) Meet CSA standards for use in pressure and non-pressure potable water applications.
        - (4) Low VOC emissions and compliant with LEED.
        - (5) Product: Weld-On 711 Low VOC PVC Cement by IPS.
      - b) Flexible, medium bodied, fast setting, high strength (flexible pipe only):
        - (1) Meet ASTM D2564 standard and applicable sections of latest edition of 'Uniform Plumbing Code'.
        - (2) Meet NSF/ANSI standard for use on potable water applications.
        - (3) Low VOC emissions and compliant with LEED.
        - (4) Product: Weld-On 795 Low VOC Flex PVC Cement by IPS.
- 15. Other Components:
  - a. Recommended by Manufacturer and subject to Architect's review and acceptance before installation.

b. Provide components necessary to complete system and make operational.

#### PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Category Three National Account Approved Smart Controller Installers. See Section 01 6200 for definitions of Categories:
  - 1. Provide Qualification documentation as described under Informational Submittals in Part 1 GENERAL:
    - a. Weather Reach: Manufacture approved Installer (see www.weatherreach.com for details).

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Perform source pressure test at stub-out on main water line provided for irrigation system, or at near-by fire hydrant.
  - 2. Notify Architect if pressures over 70 psi (480 kPA) or under 55 psi (379 kPA) are found to determine if some redesign of system is necessary before beginning work on system.

#### 3.3 PREPARATION

- A. Protection:
  - 1. Protection Of In-Place Conditions:
    - a. Repair or replace work damaged during course of Work at no additional cost to Owner. If damaged work is new, installer of original work shall perform repair or replacement.
    - b. Do not cut existing tree roots measuring over 2 inches (50 mm) in diameter in order to install irrigation lines.
- B. Surface Preparation:
  - 1. Layout of Irrigation Heads:
    - a. Location of heads and piping shown on Contract Drawings is approximate. Actual placement may vary slightly as is required to achieve full, even coverage without spraying onto buildings, sidewalks, fences, etc.
    - b. During layout, consult with Architect to verify proper placement and make recommendations, where revisions are advisable.
    - c. Minor adjustments in system layout will be permitted to avoid existing fixed obstructions.
    - d. Make certain changes from Contract Documents are shown on Record Drawings.

#### 3.4 INSTALLATION

- A. Trenching And Backfilling:
  - 1. Pulling of pipe is not permitted.
  - 2. Excavate trenches to specified depth. Remove rocks larger than 1-1/2 inch (38 mm) in any direction from bottom of trench. Separate out rocks larger than 1-1/2 inch (38 mm) in any direction uncovered in trenching operation from excavated material and remove from areas to receive landscaping.
  - Cover pipe both top and sides with 2 inches (50 mm) of rock-free soil or sand as specified under PART 2
    PRODUCTS. Remainder of backfill to topsoil depth as specified in Section 32 9122 using native material as
    specified under PART 2 PRODUCTS and topsoil as specified in Section 32 9120, Section 32 9121 and Section 32
    9122.
  - 4. Do not cover pressure main, irrigation pipe, or fittings until Architect has inspected and approved system.
- B. Sleeving:
  - Sleeve water lines and control wires under walks and paving. Extend sleeves 6 inches (150 mm) minimum beyond
    walk or pavement edge. Cover sleeve ends until pipes and wires are installed to keep sleeve clean and free of dirt
    and debris.
  - 2. Position sleeves with respect to buildings and other obstructions so pipe can be easily removed.

## C. Grades And Draining:

- 1. In localities where winterization is required, grade piping so system can be completely drained or blown out with compressed air. If system is not designed to be blown out with compressed air:
  - a. Slope pipe to drain to control valve box where possible.
  - b. Where this is not possible, slope pipe to minimum number of low points. At these low points, install:
    - 1) 3/4 inch (19 mm) brass ball valve for manual drain. Do not use automatic drain valves.
    - 2) Install 2 inch (50 mm) Class 200 PVC pipe over top of drain and cut at finish grade.
    - 3) Provide rubber valve cap marker.
    - 4) Provide one cu ft (0.03 cu m) pea gravel sump at outlet of each drain.
  - c. Slope pipes under parking areas or driveways to drain outside these areas.
  - d. Provide and install quick-coupling valve or valves in location for easy blowout of entire system. Install quick coupler valves with 2 lineal feet (0.60 m) minimum of galvanized pipe between valve and main line.

## D. Installation of Pipe:

- 1. Install pipe in manner to provide for expansion and contraction as recommended by Manufacturer.
- 2. Unless otherwise indicated on Contract Drawings, install main lines with minimum cover of 18 inches (450 mm) based on finished grade. Install lateral lines, including those connecting drip tubing, with minimum of 12 inches (300 mm) of cover based on finish grade.
- 3. Install pipe and wires under driveways or parking areas in specified sleeves 18 inches (450 mm) below finish grade or as shown on Contract Drawings.
- 4. Locate pipe so no sprinkler head will be closer than 12 inches (300 mm) from building foundation.
- 5. Cut plastic pipe square. Remove burrs at cut ends before installation so unobstructed flow will result.
- 6. Make solvent weld joints as follows:
  - a. Do not make solvent weld joints if ambient temperature is below 35 deg F (2 deg C).
  - b. Clean mating pipe and fitting with clean, dry cloth and apply one (1) coat of primer to each surface.
  - c. Apply uniform coat of solvent cement to outside of pipe.
  - d. Apply solvent cement to fitting in similar manner.
  - e. Insert pipe completely into fitting.
  - f. Give pipe or fitting quarter turn to insure even distribution of solvent and make sure pipe is inserted to full depth of fitting socket.
  - g. Allow joints to set at least twenty four (24) hours before applying pressure to PVC pipe.
- 7. Tape threaded connections with teflon tape.
- 8. Isolation Valves:
  - a. Install as detailed and per Manufacturers recommendations.
- 9. If pipe is larger than 3 inches (75 mm), install joint restraints wherever change of direction occurs on PVC main lines.

#### E. Control Valves And Control Valve Wiring:

- 1. Install valves in plastic boxes with reinforced heavy duty plastic covers. Locate valve boxes within 12 inches (300 mm) to 24 inches (600 mm) of sidewalks and shrub bed edges with tops at finish grade. Do not install more than two (2) valves in single box.
- 2. Place 3 inches (75 mm) minimum of pea gravel below bricks supporting valve boxes to drain box. Set valve boxes over valve so all parts of valve can be reached for service. Set cover of valve box even with finish grade. Valve box cavity shall be reasonably free from dirt and debris.
- 3. Wiring:
  - a. For traditional wiring, tape control wire to side of main line every 10 feet (3.050 m). Where control wire leaves main or lateral line, enclose it in gray conduit.
  - b. Use waterproof wire connectors consisting of properly-sized wire nut and grease cap at splices and locate all splices within valve boxes.
  - c. Use white or gray color for common wire and other colors for all other wire. Each common wire may serve only one (1) controller.
  - d. Run one (1) spare control wire from panel continuously from valve to valve throughout system similar to common wire for use as replacement if wire fails:
    - 1) Run spare wire to each branch of system.
    - 2) Spare wire shall be different color than other wires. Use of green wire is not acceptable.
    - 3) Mark spare control wire visibly within valve box as an 'Un-Connected Wire'. Extend spare control wires 24 inches (600 mm) and leave coiled in each valve box. Mark spare wire visibly within controller as 'Un-Connected Wire'.

## F. Smart Controller:

- Fill out 'Smart Controller Installation Checklist' provided in Attachment of this specification during installation of Controller.
- 2. Install smart controller as per Controller Manufacturer's details and installation recommendations.
- 3. In hot climates, install out of sun exposure.

- 4. Install grounding as per Manufacturer's recommendations:
  - a. Note: if controller is mounted within building, coordinate grounding with Electrical Engineer.
- 5. Install automatic rain sensor as per Manufacturer's recommendations.
- 6. Provide sticker with Facility Manager's Contact information inside Controller, but in plain view.
- 7. Install communication connections as required: Wireless and/or ethernet.

## G. Hydrometer:

- 1. Install as detailed and as per manufacturer's recommendations.
- 2. If installed on secondary system, install downstream of filter.
- 3. Connect communication cables to smart controller. Run cables within conduit as specified in specification.

#### H. Backflow Preventer (Culinary Water Supply Only):

- 1. Install 24 inches (600 mm) minimum from structures or hardscaping.
- 2. When installed adjacent to any structure, mount test cocks on side away from structure.
- 3. Flush out system prior to installing device.
- 4. After installation, remove handles and turn over to Owner together with extra maintenance materials.

## I. Secondary Water Filter (Secondary Water Supply Only):

- 1. Install 24 inches (600 mm) minimum from building elements.
- 2. Install in such manner so that when accessing and fully opening filter enclosure, plant material and built elements are not damaged.
- 3. Flush out system prior to installing device.
- 4. If power is required, coordinate installation with electrical.

# J. Pressure Reducing Valve:

1. Install as per details and manufacturer's recommendations.

## K. Sprinkler Heads And Rotor Pop-ups:

- 1. Set sprinkler heads and quick-coupling valves perpendicular to finish grade.
- 2. Do not install sprinklers using side inlets. Install using base inlets only.
- 3. Heads immediately adjacent to mow strips, walks, or curbs shall be one inch (25 mm) below top of mow strip, walk, or curb and have one inch (25 mm) to 3 inch (75 mm) clearance between head and mow strip, walk, or curb.
- 4. Set sprinkler heads at consistent distance from walks, curbs, and other paved areas and to grade by using specified components or other method demonstrated in Pre-Construction Conference.

## L. Drip Assembly:

- 1. Install pipe providing for expansion and contraction as recommended by Manufacturer.
- 2. Cut tubing square and remove burrs at cut ends.
- 3. Distribution tubing shall be between 14 inches (350 mm) minimum and 48 inches (1 200 mm) maximum long. Layout PVC lateral lines as necessary to keep distribution tubing lengths within specified tolerances.
- 4. Locate drip emitter on uphill side of plant within rootball zone.
- 5. Layout in-line tubing for trees as indicated on Contract Drawings. Layout in-line tubing for shrubs and groundcovers so plants receive water within rootball zones.
- 6. Locate in-line tubing on top of soil but under bark mulch and weed barrier fabric.
- 7. Staple in-line tubing to ground at 6 foot (1 800 mm) maximum intervals and within 12 inches (300 mm) of ends and intersections.
- 8. Assembly Using Solvent Weld Joints:
  - a. Do not make solvent weld joint if ambient temperature is below 35 deg F (2 deg C).
  - b. Clean mating pipe and fitting with clean, dry cloth.
  - c. Apply uniform coat of PVC solvent cement to outside of pipe and inside socket of fitting.
  - d. Insert pipe completely into fitting.
  - e. Give pipe or fitting quarter turn to insure even distribution of solvent and make sure pipe is inserted to full depth of fitting socket.
  - f. Allow joints to set twenty four (24) hours minimum before applying pressure to pipe.
- 9. Assembly Using 'Funny Pipe' Type Joints:
  - a. Connect distribution tubing to lateral line using barbed ell fitting.
  - b. Connect fitting to distribution tubing using straight barbed fitting with 1/2 inch (13 mm) threaded end.
- M. Before installation of sprinkler heads and drip emitters, open control valves and use full head of water to flush out system.
- N. Arrange valve stations to operate in an easy-to-view progressive sequence around building. Tag valves with waterproof labels showing final sequence station assignments.

## 3.5 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
  - 1. Irrigation System:
    - a. System Pressure Test:
      - 1) Notify Landscape Architect two (2) working days minimum before conducting test.
      - 2) In presence of Landscape Architect, pressure test main line with all valves installed.
      - 3) Test pressure at 100 psi (690 kPA) minimum for two (2) hours minimum.
      - 4) Verify there are no leaks.
      - 5) Receive Landscape Architect approval to proceed prior to backfilling.
    - b. Test report:
      - 1) Following pressure test, create pressure test report. Document pressure test results through providing photos, listing processes used, issues encountered, and measures taken to correct problems.
  - 2. Smart Controller Testing:
    - a. Use 'Smart Controller Installation Checklist' or 'Manufacturer's Operational Report' to test system to verify following:
      - 1) Verify all aspects of smart controller installation checklist or 'Manufacturer's Operational Report' are complete.
      - Verify controller is installed correctly and will automatically adjust irrigation run times in response to environmental changes using sensor and weather information to manage watering times and frequency.
      - 3) Sign 'Smart Controller Installation Checklist' to be included in Closeout Submittals.
  - 3. Weather Reach Controller Link 'Manufacturer's Operational Report':
    - a. Installer to submit installation documentation to Manufacturer and request 'Manufacturer's Operational Report':
      - 1) Submittals include:
        - a) Completed 'Smart Controller Installation Checklist'.
        - b) Installation photographs.
        - c) Irrigation Controller Settings Worksheet.
        - d) Controller Link Settings Worksheet.
      - 2) Manufacturer shall review submittals, device logs, settings and operational performance:
        - a) Receive 'Manufacturer's Operational Report'.
        - b) Installer to correct problems identified in 'Manufacturer's Operational Report'.
  - 4. Substantial Completion Walkthrough:
    - Landscape Architect or designated representative(s) will inspect site and create list of non-conforming items to be resolved prior to Irrigation Final Acceptance. Date on this list will act as date of Landscape Substantial Completion.
    - b. Installations completed after water source has been turned off for season, as determined by Landscape Architect, will be inspected following spring after system can be checked for proper operation.
  - 5. Irrigation Final Acceptance:
    - a. Irrigation Final Acceptance will be awarded when all non-conforming work is brought into conformance.
- B. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to following:
  - 1. Underground Sprinkler System:
    - Correct any work found defective or not complying with Contract Document requirements at no additional cost to Owner.

## 3.6 ADJUSTING

- A. Sprinkler Heads:
  - 1. Adjust sprinkler heads to proper grade when turf is sufficiently established to allow walking on it without appreciable harm. Such lowering and raising of sprinkler heads shall be part of original contract with no additional cost to Owner.
  - 2. Adjust sprinkler heads for proper distribution and trim so spray does not fall on building.
- B. Watering Time:
  - 1. Adjust watering time of valves to provide proper amounts of water to plants.

## 3.7 CLOSEOUT ACTIVITIES

- A. Training:
  - 1. After system is installed and approved, instruct Owner's designated personnel in complete operation and maintenance procedures using Landscape Management Plan (LMP).
    - a. Describe difference between plant establishment schedule and long term maintenance schedule.

- b. Describe annual and regular filter maintenance.
- 2. Smart Controller Training:
  - a. Following completion of Irrisoft Weather Reach Controller Link 'Manufacturer's Operational Report', Installer to instruct Owner's designated personnel in complete operation and maintenance of smart controller.
  - b. Installer to review terms of Warranty, Maintenance procedures and contact information with Owner's Representative.
- B. Winterization and Spring Start-Up:
  - 1. During first year of operation, Installer shall shut-down irrigation system prior to freezing temperatures and re-start irrigation system at beginning of growing season:
    - a. Winter Shut-Down is intended to remove all potentially damaging water from irrigation system. Perform following as well as any other efforts necessary to properly winterize system:
      - 1) Turn off water source at point of connection.
      - 2) Blow out system with pressurized air, turning on each valve until water is cleared out of system. Run through system twice. Only blow out components suitable to receive pressurized air. Hydrometers, for instance, should not be blown out. Do not use excessive air pressure that will damage pipes and parts.
      - 3) Turn controller off.
      - 4) Open all manual drain valves.
      - 5) Drain, wrap, protect, or remove any backflow device exposed to freezing temperatures using manufacturer's recommendations and best practices. Coordinate method with Owner's Representative.
      - 6) Drain and remove pumps for Owner's Representative storage.
      - 7) Drain filters using manufacturer's recommendations.
      - 8) Check sprinkler heads to make sure they are below sidewalk and curb levels and not vulnerable to snowplow damage. Lower heads to proper elevation.
      - 9) Notify Owner's Representative when system has been turned off.
    - b. Spring start-up shall include following:
      - 1) Close all manual valves.
      - 2) Clean pump filters and replace if necessary.
      - 3) Remove freeze protection as required.
      - 4) Turn on water source at point of connection.
      - 5) Verify that controller(s), rain sensor and moisture sensor(s) (if applicable) are properly operating. Change battery in controller(s) and sensor(s) as required.
      - 6) Flush entire system. Run each valve for two (2) minutes to check for damage, leaks, and coverage.
      - 7) Repair and adjust system as needed. Fine tune heads for efficient coverage.
      - 8) Notify Owner's Representative when system has been charged and is in full repair.

## END OF SECTION

# **ATTACHMENTS**

## Smart Controller Installation Checklist

# Weather Reach Controller Link

Procedures for Final Inspection of LDS Church Installations:

The following checklist details all items for Weather Reach Controller Link installation that are required by Irrisoft and certified by Installer prior to final inspection by Irrisoft technician. This checklist is for smart controller verification purposes only and does not cover all requirements given in Project Specifications.

Pre-Installation:					
Brand and model of host irrigation controller is listed as compatible or approved by Irrisoft, Inc. Installation location within operating range of compatible facility operated Wi-Fi Access Point. If existing irrigation system; the system was tested, inspected and repaired (as needed).					
stallation:					
Controller Link mounted near host irrigation controller in vertical upright position.  24 volt AC power connected from host controller to Controller Link 24VAC Power Input.  Controller Link ground terminal connected to earth ground.  Valve common from host controller connected to Controller Link Common IN terminal.  Valve common wire going to all sprinkler valves connected to Controller Link Common OUT terminal.  Program Start Sensors wired per site conditions and manufacturer's instructions.  All valves can be activated by host irrigation controller when Controller Link enables irrigation.  No valves can be activated by host irrigation controller when Controller Link interrupts irrigation.  Wires properly routed through wire entry seal.					
Host Controller Programing:					
Zones assigned to Programs with similar watering requirements.  Program cycle Water Days set to every day (unless special circumstances exist).  Program Cycle Start times set based on site needs.  Station run-times set to apply the amount of water to satisfy site-specific required irrigation amount).  Program cycles do not overlap.  Settings documented on Irrigation Controller Settings Worksheet.  Host irrigation controller set to Auto/Run.					
Controller Link Programming:					
Controller Link is connected to the Internet. Representative Weather Source selected. Connect Rain Source selected. Passed "Check PGM (Program) Wiring" test in accordance with Installation and Operation Guide. Programs are set to Smart Control (unless there are site specific exceptions or program is not used). Number of cycle starts setting matches host controller settings. Irrigation Amount settings consistent with site conditions, valve run-time and sprinkler precipitation rates. Landscape Adjustment percent is in accordance with site conditions and irrigation. Weather Interrupts settings appropriate for site conditions. Flow Sensor settings (if used) appropriate for site conditions. Program Moisture Levels consistent with current field conditions. Verify weather data is current. Settings documented on Controller Link Settings Worksheet.					

# 5. Weather Reach Access (Web-based Remote Management):

	Call Irrisoft customer service at (435) 755-0400 to setup account.  Provide: Project Information detail.  Email notifications setup complete.  Controller Link settings and logs are updating in Weather Reach Access.
6.	Netafim Hydrometer Installation (if required):
	Installed in accordance with manufacturer's guidelines.  Wire connections made with approved water-tight wire connectors.  Master Valve wiring connected to host irrigation controller.  Flow sensor wiring connected to Controller Link Flow Sensor terminal.  Controller Link reports expected flow - tested at 3 flow rates.
7.	Tipping Rain Gauge Installation (if required):
	Tipping rain gauge installed in an unobstructed location to catch natural rainfall.  Tipping rain gauge level and securely installed.  Wire from the rain gauge to the Controller Link is protected and secure.  Rain gauge wire connected to Controller Link Rain Tip terminal.  Controller Link "Rain Source" set to "Rain Gauge 1mm/tip".  Test rain gauge by tipping the spoon and verifying the 0.04" of rain measurement in the Controller Link.
8.	Final Check:
	Landscape health inspected – plants are getting adequate water but not too much.  Controller Link irrigation logs match actual watering history.  Prepared installation documents to be submitted to Irrisoft, Inc. for 'Manufacturer's Operational Report'. Include: 1) Signed Installation Check List. 2) Digital photographs clearly showing all wiring connections made in and between host controller and Controller Link. 3) If installed, rain gauge and Hydrometer installation photographs. 4) Irrigation Controller Settings Worksheet.  Completed programming worksheets left in host irrigation controller and include with Closing Submittals.

PROJECT INFORMATION (available from Owner's Representative or Project Architect)

Project Name: Property No.:				
Project Site Address:				
		FM Office Address:		
Controller Link Installation Date:				
Host irrigation controller model number and r	number of stations:			
I hereby certify that Smart Controller Installati	on Checklist has been comp	pleted and all deficiencies have been correc	ted	
Installer Name:	Phone No.:	Date:		
Signature:	Printed Signature:			
Order 'Manufacturer's Operational Report' an	d submit required installatio	n documentation to Irrisoft, Inc.		
Date:				

# **SECTION 32 9001** COMMON PLANTING REQUIREMENTS

#### PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Includes But Not Limited To:
  - Common procedures and requirements for landscaping work.
  - Provide maintenance for new landscaping as described in Contract Documents.

#### Related Requirements: В.

- Pre-Installation conferences held jointly with Section 32 9001 as described in Administrative Requirements on Part 1 of this specification section:
- Section 01 4301: 'Quality Assurance Qualifications'.
- Section 31 0501: 'Common Earthwork Requirements': 3.
- Section 31 1100: 'Clearing and Grubbing'.
- Section 31 1413: 'Topsoil Stripping And Stockpiling'. Section 31 2213: 'Rough Grading'.
- Section 31 2216: 'Fine Grading'.
- Section 31 2316: 'Excavation'. 8.
- Section 31 2323: 'Fill'.
- 10. Section 32 8423: 'Underground Sprinklers'.
- 11. Section 32 9120: 'Topsoil And Placement'.
- 12. Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report).
- 13. Section 32 9122: 'Topsoil Grading'.
- 14. Section 32 9223: 'Sodding'.
- 15. Section 32 9219: 'Seeding'.
- 16. Section 32 9300: 'Plants'.

#### REFERENCES 1.2

#### Α. Definitions:

- Landscape Management Plan (LMP): LMP is an Owner's Representative's quick reference maintenance document. It is a combination of Irrigation Sections from 32 8000 and Planting Sections from 32 9000. The LMP document is created from Operations and Maintenance Data, Warranty Documentation, and Record Documentation
- Plant Establishment Period: Time required for plants to successfully develop root systems into surrounding soil. Following this period, irrigation run times are typically modified. For purposes of this contract, the plant establishment period is assumed to be one (1) year from date of Substantial Completion.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 01 3100 and held jointly with following sections:
    - Section 32 8423: 'Underground Sprinklers'.
    - Section 32 9120: 'Topsoil And Placement'. b.
    - Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report). C.
    - Section 32 9122: 'Topsoil Grading'. d.
    - Section 32 9223: 'Sodding'. e.
    - Section 32 9219: 'Seeding'. f.
    - Section 32 9300: 'Plants'.
  - In addition to agenda items specified in Section 01 3100, review the following:
    - Site Visits:
      - Landscape Architect to visit site five (5) times during project construction.
      - If site conditions necessitate additional visits, Landscape Architect can schedule addition site visits with approval from Architect prior to bid.

- 3) During construction, addition site visits may be approved in writing by Architect or Owner for special considerations before commencement.
- Site visits caused by lack of work progress by Landscape Subcontractor shall reimburse Landscape 4) Architect amount determined by Architect or Owner for additional site visits.
- Coordination: b.
  - Landscape Subcontractor and Landscape Architect to coordinate site visits and include Architect and General Contractor in communications.
- Landscape Maintenance:
  - Establish responsibility for maintenance of new landscaping during all phases of construction period.
- d. Percolation Test:
  - Prepare two (2) typical landscape planting excavations and conduct percolation test to verify that water drains away within two (2) hours.
  - Discuss results of percolation tests with Architect and Owner's Representative.
- Review additional agenda items as specified in related sections listed above.
- Approved Site Visits:
  - Site Visit No. 1:
    - Description: 1)
      - Landscape pre-installation Conference.
    - Schedule: Conduct pre-installation conference after completion of Fine Grading specified in Section 31 2216, but one (1) week minimum before beginning landscape work.
    - 3) Required Attendees:
      - Project Manager, Facilities Manager, Architect, General Contractor, Landscape Subcontractor, Excavator, and Landscape Architect.
      - Include Landscaping Subcontractor Foreman and those responsible for installation of landscaping to be in attendance.
    - Related Sections: 4)
      - Section 31 0501: 'Common Earthwork Requirements'.
      - Section 32 8423: 'Underground Sprinklers'.
      - c)
      - Section 32 9120: 'Topsoil And Placement'.
        Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report).
      - Section 32 9122: 'Topsoil Grading'. e)
      - Section 32 9223: 'Sodding'. f)
      - g) Section 32 9219: 'Seeding'.
      - h) Section 32 9300: 'Plants'.
    - 5) Notes:
      - Verify project site conditions and review scope of work before installation begins.
      - b) Verify appropriate sub-grades have been established.
  - Site Visit No. 2: b.
    - Description: 1)
      - Irrigation system pressure test compliance, main line inspection, valve inspection.
    - Schedule: Conduct site visit one (1) week minimum after notification before beginning irrigation 2) system pressure test.
    - Required Attendees: 3)
      - General Contractor, Landscape Subcontractor, Landscape Architect.
    - 4) Recommended Attendees:
      - Project Manager, Facilities Manager.
    - **Related Sections:** 
      - Section 32 8423: 'Underground Sprinklers'.
      - Section 32 9120: 'Topsoil And Placement'.
      - Section 32 9122: 'Topsoil Grading'. c)
    - Notes:
      - a) Verify finish grading in preparation for planting.
  - Site Visit No. 3:
    - Description:
      - Inspect and approve plant quality, plant quantity, plant pits, plant pit backfill, planting depths, and removal of packaging/distribution materials, wire, and ties.
    - Schedule: Conduct site visit one (1) week minimum after notification from Contractor before beginning site visit no. 3.
    - 3) Required Attendees:
      - General Contractor, Landscape Subcontractor, Landscape Architect.
    - 4) Recommended Attendees:
      - Project Manager, Facilities Manager.
    - Related Sections: 5)

- a) Section 32 9300: 'Plants'.
- 6) Notes:
  - a) Inspect irrigation system installation, inspect weed barrier fabric.
- d. Site Visit No. 4:
  - 1) Description:
    - a) Comprehensive Substantial Completion inspection prior to beginning thirty (30) day Landscape Subcontractor maintenance period.
  - 2) Schedule: Conduct site visit one (1) week minimum after notification before beginning site visit no. 4.
  - 3) Required Attendees:
    - Project Manager, Facilities Manager, Architect, General Contractor, Landscape Subcontractor, Landscape Architect.
  - 4) Related Sections:
    - a) Section 32 8423: 'Underground Sprinklers'.
    - b) Section 32 9300: 'Plants'.
  - 5) Notes:
    - a) Verify contract requirements have been followed including but not limited to: planting compliance, irrigation system coverage and irrigation system operation.
- e. Site Visit No. 5:
  - 1) Description:
    - a) At the end of thirty (30) day Landscape Subcontractor maintenance period, verify deficient items have been corrected and verify no others exist.
  - 2) Schedule: Conduct site visit one (1) week minimum after notification before beginning site visit no. 5.
  - 3) Required Attendees:
    - Project Manager, Facilities Manager, Architect, General Contractor, Excavation Subcontractor, Landscape Subcontractor, Landscape Architect.
  - 4) Related Sections:
    - a) Section 32 8423: 'Underground Sprinklers'.
    - b) Section 32 9300: 'Plants'.
  - 5) Notes:
    - Review Landscape Management Plan (LMP) with Owner's Representative. Provide landscape maintenance training.

### 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Landscape Architect will provide certificate acknowledging 'Plant Establishment Period' commencement:
      - 1) Certificate will include name and signature of Contractor, Contractor's company, Contractor's telephone number, and date.
      - 2) Certificate will include name and signature of Owner's Representative, Owner's Representative's Group name, Owner's Representative Group telephone number, and date.
      - Certificate will acknowledge date when Establishment Period begins and that it extends one (1) year from that time.
  - 2. Special Procedure Submittals:
    - a. Installer to provide two (2) copies of following recommendations to be included in Closeout Submittals:
      - 1) Landscape maintenance recommendations.
      - 2) Individual landscape maintenance recommendations.
      - 3) Plant establishment maintenance recommendations.
      - 4) Post-plant establishment maintenance recommendations.
  - 3. Qualification Statement:
    - a. Landscape Subcontractor:
      - 1) Provide Qualification documentation if requested by Landscape Architect or Owner.
    - b. Installer:
      - 1) Provide Qualification documentation if requested by Landscape Architect or Owner.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800 (combine with sections of 32 8000 and sections of 32 9000 if applicable):
    - a. Record Documentation:
      - 1) Submit one (1) copy certificate for 'Plant Establishment Period' acknowledgement.
      - 2) Submit one (1) copy of recommendations specified in Special Procedure Submittals.
      - 3) Record Drawings:

- a) As installation occurs, prepare accurate record drawings. Submit one (1) full size copy prior to final inspection. Drawing shall include:
  - (1) Detail and dimension changes made during construction.
  - (2) Take dimensions from permanent constructed surfaces or edges located at or above finish grade.
- b. Landscape Management Plan (LMP):
  - 1) Landscape Section:
    - a) Submit one (1) copy certificate for 'Plant Establishment Period' acknowledgement.
    - b) Submit one (1) copy of recommendations specified in Special Procedure Submittals.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Post-Emergent Weed Control:
    - a. Products shall be recognized for intended use by AHJ.
- B. Qualifications:
  - 1. Landscape Subcontractor. Requirements of Section 01 4301 applies, but not limited to following:
    - a. Company specializing in performing work of this section.
    - b. Minimum five (5) years experience in landscaping installations.
    - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - d. Upon request, submit documentation.
  - 2. Installer:
    - a. Planting shall be performed under direction of foreman or supervisor with minimum three (3) years experience in landscape installations similar in size, scope, and complexity.
    - b. Foreman or supervisor required to attend pre-installation conference.
    - c. Use trained personnel familiar with required planting procedures and with Contract Documents.
    - d. Upon request, submit documentation.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
  - 1. Deliver packaged materials in containers showing weight, analysis, and name of Manufacturer.
  - 2. Deliver sod, plants, trees, and shrubs in healthy and vigorous condition.
  - 3. Protect materials from deterioration during delivery.
- B. Storage And Handling Requirements:
  - 1. Store in location on site where they will not be endangered and where they can be adequately watered and kept in healthy and vigorous condition.
  - 2. Protect materials from deterioration while stored at site.

#### PART 2 - PRODUCTS

## 2.1 POST-EMERGENT WEED CONTROL

- A. Type Two Acceptable Products:
  - 1. Enide by Upjohn.
  - 2. Dymid by Elanco.
  - 3. Treflan or Surflan by Dow Agrosciences.
  - 4. Eptan by Syngenta.
  - 5. Equal as approved by Architect before use. See Section 01 6200.

#### PART 3 - EXECUTION

## 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

#### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Inspect site and Contract Documents to become thoroughly acquainted with locations of irrigation, ground lighting, and utilities.

#### 3.3 PREPARATION

- A. Before proceeding with work, verify dimensions and quantities. Report variations between Drawings and site to Architect before proceeding with landscape work.
  - 1. Plant totals are for convenience of Contractor only and are not guaranteed. Verify amounts shown on Drawings.
  - 2. All planting indicated on Contract Documents is required unless indicated otherwise.
- B. Protection:
  - 1. Take care in performing landscaping work to avoid conditions that will create hazards. Post signs or barriers as required.
  - 2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.
  - 3. Keep site well drained and landscape excavations dry.

#### 3.4 INSTALLATION

- A. Interface With Other Work:
  - 1. Do not plant trees and shrubs until major construction operations are completed. Do not commence landscaping work until work of Section 31 2216 and Section 32 8423 has been completed and approved.
- B. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.
- C. Hand excavate as required.
- D. Maintain grade stakes until parties concerned mutually agree upon removal.
- E. When conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions, notify Architect before planting.

## 3.5 FIELD QUALITY CONTROL

- A. Field Inspection:
  - 1. Landscape Architect will inspect landscaping installation at Substantial Completion.
- B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
  - 1. Replace landscaping that is dead or appears dead as directed by Landscape Architect within ten (10) days of notification and before Substantial Completion at no additional cost to Owner.
  - 2. Replace damaged plantings at no additional cost to Owner.
  - 3. Repair damage to irrigation, ground lighting, utilities, asphalt paving, concrete paving, concrete sidewalks, concrete curb and gutters and other items adjacent to landscaping caused by work of this Section or replace at no additional cost to Owner.

## 3.6 CLEANING

- A. Waste Management:
  - 1. Immediately clean up soil or debris spilled onto pavement and dispose of deleterious materials.

#### 3.7 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  - 1. Include following training:
    - a. Review Landscape Management Plan (LMP):
      - 1) Review maintenance recommendations.
    - b. Review Maintenance as specified at the end of this specification.
  - 2. Establishment Period Acknowledgement (coordinate with 32 8000 section):
    - a. Landscape Architect will acknowledge Establishment Period commencement.

#### 3.8 PROTECTION

- A. Protect planted areas against traffic or other use immediately after planting is completed by placing adequate warning signs and barricades.
- B. Provide adequate protection of planted areas against trespassing, erosion, and damage of any kind. Remove this protection after Architect has accepted planted areas.

#### 3.9 MAINTENANCE

- A. General:
  - 1. Before beginning maintenance period, plants shall be in at least as sound, healthy, vigorous, and in approved condition as when delivered to site, unless accepted by Architect in writing at final landscape inspection.
  - 2. Maintain landscaping from completion of landscape installation to thirty (30) days after Substantial Completion Meeting. Areas sodded or seeded after November 1st will accepted following spring approximately one (1) month after start of growing season, May 1st or as determined by Architect, if specified conditions have been met.
  - 3. Replace landscaping that is dead or appears unhealthy or non-vigorous as directed by Architect before end of maintenance period. Make replacements within ten (10) days of notification. Lawn that does not live and has to be replaced shall be guaranteed and maintained an additional thirty (30) days from date of replacement.

## B. Seeded Areas:

1. Seeded areas will not be accepted as complete and thirty (30) day maintenance period will not begin until uniform stand of seedlings at least 3 inches (75 mm) tall has been obtained.

## C. Sodded Lawn:

- 1. Maintain sodded lawn areas until lawn complies with specified requirements and throughout maintenance period.
- 2. Water sodded areas in sufficient quantities and at required frequency to maintain sub-soil immediately under sod continuously moist 3 to 4 inches (75 to 100 mm) deep.
- 3. Cut grass first time when it reaches 3 inches (75 mm) high. Continue to mow at least once each week throughout maintenance period. Remove clippings.
- 4. Apply weed killer as necessary to maintain weed-free lawn. Apply weed killer in accordance with manufacturer's instructions during calm weather when air temperature is between 50 and 80 deg F (10 and 27 deg C).
- 5. At end of thirty (30) day maintenance period, fertilize lawns as recommended in Section 32 9113.

## D. Trees, Shrubs, And Plants:

- 1. Maintain by pruning, cultivating, and weeding as required for healthy growth.
- 2. Restore planting basins.
- 3. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical positions as required.
- 4. Spray as required to keep trees and shrubs free of insects and disease.
- 5. Provide supplemental water by hand as needed in addition to water from sprinkling system.

# **END OF SECTION**

# SECTION 32 9120 TOPSOIL AND PLACEMENT

#### PART 1 - GENERAL

## 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform topsoil evaluation and placement required prior to topsoil grading as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 0501: 'Common Earthwork Requirements':
  - 2. Section 31 1413: 'Topsoil Stripping And Stockpiling' for stripping and storing of existing topsoil.
  - 3. Section 31 2216: 'Fine Grading' for landscaping and planting areas.
  - 4. Section 32 9001: 'Common Planting Requirements':
    - a. Pre-installation conference held jointly with other common planting related sections.
  - 5. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on Topsoil Testing Report).
  - 6. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.

## 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 32 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 32 9001, review following:
    - a. Review finish grade elevation and tolerance requirements.
    - b. Review surface preparation requirements including disking, tilling, ripping, or aerating.
    - c. Review Attachment 'Topsoil Testing Report' including:
      - 1) Landscape Architect, Contractor, Testing, and Soil Testing Laboratory Instructions.
    - d. Review Field Quality Control testing requirements for 'Topsoil Testing Report' including:
      - 1) Corrections required for topsoil not meeting requirements of this specification.
      - 2) Approval requirement of 'Topsoil Testing Report' by Landscape Architect.
      - 3) Submittals required as identified in Closeout Submittals.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Testing And Evaluation Reports:
    - a. Use 'Topsoil Testing Report' attachment to this specification for Topsoil Testing as specified in 'Field Quality Control' in Part 3 of this specification for imported topsoil and account of recent use:
      - 1) Owner will pay for one (1) final test, that has already been completed for the existing site topsoil.
      - 2) Additional test(s) if necessary will be paid by Contractor.
      - 3) Submit two (2) copies of Final 'Topsoil Testing Report' approved by Landscape Architect to be included with Closeout Submittals.
  - 2. Field Quality Control Submittals:
    - a. Submit report stating location of source of imported topsoil and account of recent use.
    - b. Submit delivery slips indicating amount of physical amendments delivered to Project site.

- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Submit one (1) copy Final approved 'Topsoil Testing Report'.
      - 2) Provide report stating location of source of imported topsoil and account of recent use.
    - b. Landscape Management Plan (LMP):
      - 1) Landscape Section:
        - a) Submit one (1) copy in LMP Landscape Section Final approved 'Topsoil Testing Report'.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Topsoil:
  - 1. Design Criteria:
    - a. Topsoil used in landscaped areas, whether imported, stockpiled, or in place, shall be weed free, fertile, loose, friable soil meeting following criteria:
      - 1) Chemical Characteristics:
        - a) pH 5.5 to 8.0.
        - b) Soluble Salts: less than 3.0 mmhos/cm.
        - c) Sodium Absorption Ratio (SAR): less than 6.0.
        - d) Organic Matter: greater than one percent.
      - 2) Physical Characteristics:
        - a) Gradation as defined by USDA triangle of physical characteristics as measured by hydrometer.
          - (1) Sand: 15 to 60 percent.
          - (2) Silt: 10 to 60 percent.
          - (3) Clay: 5 to 30 percent.
        - b) Clean and free from toxic minerals and chemicals, noxious weeds, rocks larger than or equal to 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.
        - Soil (Coordinate screening as specified in Section 31 1413 'Topsoil Stripping And Stockpiling' to meet these characteristics):
          - (1) Soil shall not contain more than five (5) percent by volume of rocks measuring over 1/4 inch (6 mm) in largest size.
          - (2) Soil shall be topsoil in nature.
          - (3) Soil resembling road base or other like materials are not acceptable.
  - 2. Project Topsoil Requirements:
    - a. It is anticipated that following percentages of material will be required to meet topsoil requirements of Project site:
      - 1) Imported Topsoil: 0 percent of landscape area:
        - a) N/A
      - 2) Stockpiled Topsoil (stripped from site prior to construction): 100 percent of landscape area:
        - a) Lawn Areas: 28.2 percent of stockpiled topsoil.
        - b) Shrub / Tree Areas/ Native Grass: 71.8 percent of stockpiled topsoil.
      - 3) In-Place Topsoil: 0 percent of landscape area:
        - a) N/A

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Do not commence work of this Section until grading tolerances specified in Section 31 2216 are met.
  - 2. Do not commence work of this Section until coordination with Section 32 9121 'Physical Preparation' and Section 32 9122 'Topsoil Grading' and if required by these specifications prior to placement.
  - 3. Receive approval from Landscape Architect of subgrade elevations prior to commencement of this Work.

## 3.2 PREPARATION

- A. Protection Of In-Place Conditions:
  - 1. Protect utilities and site elements from damage.
- B. Surface Preparation:
  - 1. Surfaces to receive Imported and Stockpiled Topsoil:
    - a. Disk, till, rip, or aerate with approved agricultural aerator to depth of 6 inches (150 mm).
    - b. Place specified and approved topsoil on prepared surface.

### 3.3 PERFORMANCE

#### A. General:

- 1. After Surface Preparation requirements are completed, limit use of heavy equipment to areas no closer than 6 feet (1.80 meter) from building or other permanent structures. Use hand held tillers for preparation of subsoil in areas closer than 6 feet (1.80 m).
- 2. Do not expose or damage existing shrub or tree roots.

#### B. Topsoil Depth/Quantity:

- 1. Total topsoil depth of 5 inches (125 mm) minimum in lawn and groundcover planting areas.
- 2. No topsoil as defined in this Section is required over tree and shrub planting areas or native grass, shrub, or tree areas as long as what is in place is not excessively rocky or otherwise unfavorable to healthy plant growth.
- 3. Provide no less than quantity required to achieve tolerance described in Section 32 9122 'Topsoil Grading' along with additional physical soil amendments required in Section 32 9121 'Topsoil Physical Preparation'. Installer of this section responsible for providing sufficient topsoil material.

#### C. Stockpiled Topsoil:

- 1. Redistribute tested and approved existing topsoil stored on site as result of work of Section 31 1413 'Topsoil Stripping And Stockpiling'.
  - a. Before placing topsoil, remove organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.
  - b. Do not place topsoil whose moisture content makes it prone to compaction during placement process.
  - c. Do not place topsoil when subgrade is either wet or frozen enough to cause clodding.

## D. In Place Topsoil:

- 1. At locations where topsoil can remain in place and has been tested and approved, perform the following:
  - a. Remove existing vegetation as required in preparation for new landscaping.
  - b. Remove vegetative layer, roots, organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.

## E. Grading:

- Slope grade away from building for 12 feet (3.60 m) minimum from walls at slope of 1/2 inch in 12 inches (13 mm in 300 mm) minimum unless otherwise noted.
  - a. High point of finish grade at building foundation shall be 6 inches (150 mm) minimum below finish floor level.
  - b. Direct surface drainage in manner indicated on Contract Documents by molding surface to facilitate natural run-off of water.
  - c. Fill low spots and pockets with topsoil and grade to drain properly.

## 3.4 FIELD QUALITY CONTROL

- A. Testing And Inspections:
  - 1. Topsoil Testing:
    - a. Test topsoil for project suitability using Owner supplied 'Topsoil Testing Report,' attachment to this specification:
      - 1) Testing requirements:
        - a) If testing report shows topsoil does not meet topsoil Design Criteria and 'Topsoil Testing Report: Soil Test Data' requirements, topsoil is non-conforming. Corrections and re-testing are required until topsoil meets requirements.
        - b) Use new 'Topsoil Testing Report', each time topsoil is tested.

After topsoil testing is approved by Landscape Architect, submit two (2) copies of Final 'Topsoil Testing Report as specified in Part 1 'Submittals' of this specification.

# B. Non-Conforming Work:

- 1. If topsoil does not meet topsoil Design Criteria and 'Topsoil Testing Report: Soil Test Data' requirements topsoil will be re-tested at no cost to Owner.
  - a. Correction procedures:
    - Topsoil not meeting specified physical characteristics of sand, silt, and clay shall be removed from site.
    - Topsoil not meeting specified organic or fertility specifications may be amended in place with materials recommended in Topsoil Testing Report.
    - 3) If amendments are necessary, submit proposed amendments and application rates required to bring topsoil up to minimum specified requirements.
    - 4) Re-test topsoil and remove and amend as required until it meets minimum specified requirements.
  - b. Submit report to Landscape Architect for approval.
  - c. Receive approval from Landscape Architect prior to planting.

END OF SECTION

#### **ATTACHMENTS**

#### **Topsoil Testing Report**

Project	Name	Property Number	
	Site Street Address, City, State/Province		
Person Submitting	Name	Date Requested	Phone
Test	Address, City, State/Province	Fax	
Soil Testing Laboratory	Name Date Submitted		Phone
	Address, City, State/Province		Fax

#### General

 Owner will pay for pre-bid testing and one (1) final topsoil test.

#### **Landscape Architect Instructions**

 Landscape Architect shall determine by investigation quality and quantity of topsoil on site before landscape design. Add physical and fertility recommendations from laboratory recommendations to relevant Church specifications.

# **Contractor Instructions**

- 1. Test installed topsoil. Installed topsoil shall comply with Project Specifications.
- If installed topsoil does not comply, Contractor will enhance and test at no cost to Owner until installed topsoil complies with Project Specifications.

# **Testing Instructions**

- Collect at least two (2) samples of on-site topsoil and each anticipated topsoil source. If site soil profile or borrow pit are not uniform, additional samples shall be taken. Uniform composite samples may also be used if properly acquired and documented.
- Submit required soil samples to soil testing laboratory along with all required (for this report and laboratory) information.

# Soil Testing Laboratory Instructions

- This report must be completely filled out and provide soil interpretation and amendment, fertilizer, and soil conditioner recommendations for use by Landscape Architect. These recommendations should consider lawn areas, tree and shrub areas, and native plant areas.
- 2. Provide appropriate times for fertilizing.
- Return completed Topsoil Testing Report to person submitting the test.

	SOIL SAMPLE LOG						
Soil Sample No.	Description of location where sample was taken	History of use of the soil					

Existing Conditions Test Report ("Acceptable Levels" refers to the allowable soil specifications prior to being amended)

	SOIL TEST DATA											
Sample No.	pH(1)	EC <sup>(1)</sup> Mmhos/cm	SAR <sup>(1)</sup>	% Sand	% Silt	% Clay	Text <sup>(2)</sup> Class	% <sup>(3)</sup> OM	NO3- N <sup>(4)</sup> ppm	P <sup>(5)</sup> ppm	K <sup>(5)</sup> ppm	Fe <sup>(5)</sup> Ppm
Acceptabl e Level(s)	5.5 - 8.4	<3.0	<6.0	15-60	10-60	5-30	(2)	>1.0	>20	>11	>130	>10

<sup>(1)</sup> Saturated soil paste 1:1 soil:water method (please Indicate)

If other methods are used for NO3-N, P, K, and Fe, then note

If other methods are used for NO3-N, P, K, and Fe, then note.						
ROCKS (Coarse Fragments)						
Sample No.	Percent > 1/4 inch (6.4 mm)	Rocks Present ≥ 1.5 inch (38 mm) Indicate as present or not present				
	percent					
	percent					
Acceptable Level	≤ 5.0 percent	< 1.5 inch (38 mm)				

#### Landscape Area Description

Lawn Areas: Receive 5 inch (125 mm) topsoil plus recommended amendments and fertilizers.

Shrub/Tree Areas: Unless otherwise indicated, plant pits are to be backfilled with three (3) parts native soil and one part compost or other recommended amendments. Additionally, contractor will add recommended fertilizer.

Native Grass/Shrub/Tree Areas: Planting to receive minimum recommended amendments and fertilizers for establishment.

textur	on infiltration rate of test sample(s) based on the at 90 percent relative density on nearest 1/10th of an inch)					
Sample No.	Rate					
	Inches/Hour					
	Inches/Hour					

# Interpretation Summary of Test Results:

<sup>(2)</sup> Hydrometer method (Acceptable soil- sand:15-60 percent, silt:10-60 percent, clay-5-30 percent)

<sup>(3)</sup>Potassium dichromate method (Walkey-Black) or loss of ignition

<sup>(4)</sup>Chromotropic acid method

<sup>(5)</sup>AB-DTPA method

Soil Amendments, Fertilizer and Soil Conditioner – Recommendations:
Lawn Areas
Shrub/Tree Areas
Native Grass/Shrub/Tree Areas
Long Term (5 Year) Fertilizer and Soil Conditioner – Recommendations:
Lawn Areas
Shrub/Tree Areas
Native Grass/Shrub/Tree Areas

# SECTION 32 9121 TOPSOIL PHYSICAL PREPARATION

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform soil preparation work as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 0501: 'Common Earthwork Requirements' for common site construction requirements.
    - a. General procedures and requirements for earthwork.
  - 2. Section 31 1413: 'Topsoil Stripping And Stockpiling'.
  - 3. Section 31 2213: 'Rough Grading'.
  - 4. Section 32 9001: 'Common Planting Requirements':
    - a. Pre-installation conference held jointly with other common planting related sections.
  - 5. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
  - 6. Section 32 9122: 'Topsoil Grading' for preparation of topsoil and addition of amendments prior to landscaping.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 32 9001.
  - 2. In addition to agenda items specified in Section 01 3100, review the following:
    - a. Review physical soil amendments.

## PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Physical Soil Amendments:
  - 1. Incorporate following soil amendments if required by Topsoil Testing Report analysis into topsoil used for Project:
    - a. Sand: 20 percent recommended.
    - b. Silt: 50 percent recommended:
    - c. Clay: 30 percent recommended:

#### PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. Physical Soil Amendments:
  - 1. Add specified soil amendments at specified rates to topsoil as directed by Soil Testing Laboratory.
  - 2. Roto-till or otherwise mix amendments evenly into topsoil.

#### END OF SECTION

# SECTION 32 9122 TOPSOIL GRADING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform topsoil grading required to prepare site for installation of landscaping as described in Contract Documents.
  - 2. Perform topsoil placement and finish grading work required to prepare site for installation of landscaping as described in Contract Documents.
  - 3. Furnish and apply soil amendments as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 0501: 'Common Earthwork Requirements':
  - 2. Section 31 1413: 'Topsoil Stripping And Stockpiling' for stripping and storing of existing topsoil.
  - 3. Section 31 2216: 'Fine Grading' for landscaping and planting areas.
  - 4. Section 32 9001: 'Common Planting Requirements':
    - a. Pre-installation conference held jointly with other common planting related sections.
  - 5. Section 32 9120: 'Topsoil And Placement' for topsoil evaluation and placement required for topsoil grading.
  - 6. Section 32 9121: 'Topsoil Physical Preparation' for physical preparation of topsoil (section included based on 'Topsoil Testing Report').

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in Section 32 9001.
  - 2. In addition to agenda items specified in Section 01 3100, review the following:
    - a. Review compost requirements to be within acceptable range as per Attachment 'Compost Quality Guidelines For Landscaping' and 'Compost Verification Report' in this specification.
    - Review soil fertility amendments and fertilizer requirements as per Attachment 'Topsoil Testing Report' in Section 32 9120.

#### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Material Data:
    - a. Soil Amendments and Fertilizer:
      - 1) Product literature and chemical / nutrient analysis of soil amendments and fertilizers.
      - 2) Proposed application rates necessary to bring topsoil up to specified requirements.
      - 3) Source location of products.
      - 4) Submit to Landscape Architect for approval prior to installation.
  - 2. Samples:
    - a. Soil Fertility Amendments and Fertilizer:
      - 1) Soil conditioner sample for approval before delivery to site.
      - 2) Product analysis.
- B. Informational Submittals:
  - 1. Testing And Evaluation Reports:
    - a. 'Compost Verification Report':
      - 1) Provide signed copy certifying that compost meets requirements of this specification.
  - 2. Field Quality Control Submittals:
    - a. Soil Fertility Amendments and Fertilizer:
      - Delivery slips indicating amount of soil amendments, compost, conditioner, and fertilizer delivered to Project site.

- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Submit 'Compost Verification Report'.
      - 2) Submit delivery slips indicating amount of physical amendments delivered to Project site.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Soil Amendments:
  - 1. Incorporate following soil amendments into existing on-site topsoil used for Project:
    - a. Acceptable Soil Amendments, Soil Conditioners, And Application Rates. (Choose one):
      - 1) 'Soil Pep': N/A
      - 2) 'Compost': N/A
      - 3) Other amendments and conditioners as specified by topsoil Testing Report, such as lime, gypsum, Axis, etc.: N/A
      - 4) Equals as approved by Architect before use. See Section 01 6200.
    - b. Acceptable Fertilizers And Application Rates:
      - 1) 1-2 lbs Nitrogen/1000 sf
      - 2) Equal as approved by Architect before installation. See Section 01 6200.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - Do not commence work of this Section until imported, stockpiled and in place topsoil are placed as specified in Section 32 9120 'Topsoil And Placement'.

#### 3.2 PREPARATION

- A. Protection Of In-Place Conditions:
  - 1. Protect utilities and site elements from damage.
- B. Surface Preparation:
  - 1. Surfaces that meet specified topsoil elevations.
    - a. Seven (7) days maximum before beginning seeding and planting:
      - Loosen topsoil 6 inch (150 mm) deep, dampen thoroughly, and cultivate to properly break up clods and lumps.
      - 2) Rake area to remove clods, rocks, weeds, roots, debris or other material 1-1/2 inches (38 mm) or more in any dimension.
      - 3) Grade and shape landscape area to bring surface to true uniform planes free from irregularities and to provide drainage and proper slope to catch basins.
  - Addition of Soil Amendments:
    - a. Add specified soil amendments at specified rates to topsoil as directed by Topsoil Testing Report found in Section 32 9120 'Topsoil And Placement'.
    - b. Add specified fertilizers at specified rates into topsoil as directed by Soil Testing Laboratory.
    - c. Roto-till or otherwise mix soil amendments evenly into topsoil.
    - d. Incorporate and leach soil amendments which require leaching, such as gypsum, within such time limits that soil is sufficiently dry to allow proper application of fertilizer and soil conditioners.

#### 3.3 PERFORMANCE

A. General:

TOPSOIL GRADING - 2 - 32 9122

- 1. Limit use of heavy equipment to areas no closer than 6 feet (1.80 meter) from building or other permanent structures. Use hand held tillers for preparation of subsoil in areas closer than 6 feet (1.80 m).
- 2. Do not expose or damage existing shrub or tree roots.
- B. Finish Grade Tolerances (As shown on General Planting Details in Contract Documents):
  - 1. Finish topsoil grade of planting areas before planting and after addition of soil additives shall be specified distances below top of adjacent pavement of any kind:
    - a. Ground Cover Areas: 2 inches (50 mm) below.
    - b. Seeded Areas: One inch (25 mm) below.
    - c. Sodded Areas: 2 inches (50 mm) below.
    - d. Tree and Shrub Areas (not individual trees): 4 inches (100 mm) below.

## C. Placed Topsoil:

- 1. At locations where topsoil has been placed as per Section 32 9120 'Topsoil And Placement', perform the following:
  - a. Remove existing vegetation as required in preparation for new landscaping.
  - Remove organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.

#### D. Grading:

- 1. Coordinate grading as described in Section 32 9120 'Topsoil And Placement'.
- E. Immediately before planting lawn and with topsoil in semi-dry condition, roll areas that are to receive lawn in two directions at approximately right angles with water ballast roller weighing 100 to 300 lbs (45 to 135 kg), depending on soil type.
- F. Rake or scarify and cut or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

#### 3.4 PROTECTION

A. After landscape areas have been prepared, take no heavy objects over them except lawn rollers.

#### END OF SECTION

# **ATTACHMENTS**

**INFORMATION:** Following Attachment for 'Compost Quality Guidelines For Landscaping' to be included in agenda Pre-Installation Conference with Installer. (Following blank page inserted for printing form separately when double siding printing if needed. Omit if not needed).

TOPSOIL GRADING - 3 - 32 9122

# COMPOST QUALITY GUIDELINES FOR LANDSCAPING

[Source: Von Isaman MS, President of QA Consulting and Testing LLC, Dr. Rich Koenig, USU Cooperative Extension Soils Specialist,

and Dr. Teresa Cerny, USU Cooperative Extension Horticulturalist, 3 March 2003]

Category	pHª	Soluble Salts <sup>a</sup> dS/m or mmho/cm	Sodium Adsorption Ratio <sup>a</sup> (SAR)	Carbon Nitrogen Ratio <sup>b</sup> (C:N)	Percent Moisture <sup>c</sup>	≥ 98 percent Coarse Material Passing (dry wt basis)
Ideal	6 to 8	≤ 5	< 10	≤ 20:1	25 to 35	<b>3</b> /8 inch (9.5 mm)
Acceptable	5-6, 8-9	≤ 10	≤ 20	21:1 to 30:1	< 25, > 35	3/4 inch (19 mm)
Suspect	< 5, > 9	> 10	> 20	<10:1, > 30:1	< 20, > 50	< 98 percent 3/4 inch (19 mm)

<sup>&</sup>lt;sup>a</sup> 1.5 Compost: Water Slurry on Coarse Material passing 3/8 inch (9.5 mm).

For composts with biosolid feedstocks, biosolids must meet EPA 503 Class A standard.

Acceptable level Soluble Salts and/or SAR composts should not exceed 3 cu yds (2.29 cu m) / 1,000 sq ft (93 sq m) for every 3 inches (76 mm) of soil depth.

	COMPOST VERIFICATION REPORT						
	рНª	Soluble Salts <sup>a</sup> dS/m or mmho/cm	Sodium Adsorption Ratio <sup>a</sup> (SAR)	Carbon Nitrogen Ratio <sup>b</sup> (C:N)	Percent Moisture <sup>c</sup>	≥ 98 percent Coarse Material Passing (dry wt basis)	
Results							
See Compost Quality Guidelines for Landscaping for footnote references.  I hereby certify that the Compost meets Ideal or Acceptable requirements as set forth in COMPOST QUALITY GUIDELINES FOR LANDSCAPING as listed with the COMPOST VERIFICATION STATEMENT. If Compost does not fall within this range, explain why and justify.							
-			Printed Signatur	re:			
Date:							

<sup>&</sup>lt;sup>b</sup> on Coarse Material passing 3/8 inch (9.5 mm).

<sup>&</sup>lt;sup>c</sup> on Total Sample

# SECTION 32 9219 SEEDING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install seeded lawn as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 32 9001: 'Common Planting Requirements':
    - a. Pre-installation conference held jointly with other common planting related sections.
  - 2. Section 32 9120: 'Topsoil And Placement'.
  - 3. Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report).
  - 4. Section 32 9122: 'Topsoil Grading'.
  - 5. Section 32 9300: 'Plants'.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 32 9001.

#### 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Written certification confirming wetland seed mix and quality:
      - 1) Include all species used.
      - 2) Include percent germination.
      - 3) Include percent weed seed.
      - 4) Include name and contact information of supplier.
- B. Closeout Submittals:
  - Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Submit one (1) copy certificate for lawn seed quality and mix.
    - b. Landscape Management Plan (LMP):
      - 1) Landscape Section:
        - a) Submit one (1) copy certificate for lawn seed quality and mix.

# 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Approval Requirements:
  - 1. Deliver seed in original sealed, labeled, and undamaged containers.
  - Be certain shelf life or date for seed is shown on label.
  - 3. Be certain label verifies seed mixture required by Contract Documents.

#### PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Seed:
  - 1. Type and mix shown on Drawings.
  - 2. Seed Grade: Certified Quality.
  - 3. Application Rate: 2.2 lbs/1000 sf (1.134 kg/93 sq m).
  - 4. Purchase seeds that bear this season's certification of weight, purity, and germination from reputable seed company.
- B. Top Dressing:
  - 1. Stone mulch

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Interface With Other Work:
  - Do not commence work of this Section until work of Sections 32 9122 and 32 9300 has been completed and approved.
- B. Tolerances:
  - 1. Final grade of soil after seeding of lawn areas is complete shall be one inch (25 mm) below top of adjacent pavement of any kind.
- C. Seeding:
  - 1. After areas are graded, sow seed evenly at specified rate with adequate equipment at time when little or no wind is blowing.
- D. Top Dressing:
  - 1. After seeding, rake or broom seed in gently and roll area to firm in seed.
  - Peat moss:
    - a. After rolling, cover area evenly with top dressing of peat moss at rate of two (2) 4 cu ft (0.1132 cu m) bales per 1,000 sq ft (93 sq m) of area.\
  - 3. Add stone mulch
- E. After Top Dressing:
  - Thoroughly water seeded areas.
  - Reseed areas that do not show prompt germination at fifteen (15) day intervals until an acceptable stand of seedlings is assured.

### 3.2 FIELD QUALITY CONTROL

- A. Field Inspection:
  - 1. Seeded areas will be accepted at Project closeout if:
    - a. Seeded areas are properly established.
    - b. Lawn is free of bare and dead spots and is without weeds.
    - c. No surface soil is visible when grass has been cut to height of 2 inches (50 mm).
    - d. Seeded areas have been mowed a minimum of twice.

# END OF SECTION

SEEDING - 2 - 32 9219

# SECTION 32 9223 SODDING

#### PART 1 - GENERAL

# 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install sodded lawn as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 32 8423: Irrigation system.
  - 2. Section 32 9001: Common Planting Requirements:
    - a. Pre-installation conference held jointly with other common planting related sections.
  - 3. Section 32 9120: 'Topsoil And Placement'.
  - 4. Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report).
  - 5. Section 32 9122: 'Topsoil Grading'.

#### 1.2 REFERENCES

### A. Definitions:

- 1. Crop Coefficients and Hydro-Zones: Crop coefficients (Kc) are used with ETo to estimate specific plant evapotranspiration rates. The crop coefficient is a dimensionless number (between 0 and 1.2) that is multiplied by the ETo value to arrive at a plant ET (ETc) estimate. Plants grouped by water needs, organized into one irrigation zone.
- 2. Eco-Region Irrigation Design: A bio-regional approach to irrigation and planting design that is relevant to the geographic area for which the planting plan and irrigation system is designed. These geographic areas are defined by the Environmental Protection Agency and have been modified by the LDS church into 15 geographical areas throughout North America, and the Hawaiian Islands.
- 3. Hardiness Zone: A hardiness zone is a more precisely geographically-defined zone within an Eco-Region in which a specific category of plant life is capable of growing, as defined by temperature hardiness, or ability to withstand the minimum temperatures of the zone. Hardiness Zones may be defined by one of two sources:
  - a. Sunset Western Garden Book Maps.
  - b. USDA Hardiness Zone Map.
  - Plant Hardiness zone sources shall be listed by the architect through the planting and irrigation design process.
- 4. Hydro-Zone: Plants grouped by water needs (similar Crop Coefficients (Kc), organized into one irrigation zone.
- 5. Reference Evapotranspriation (ETo): The total water lost from the soil (evaporation) and from the plant surface (transpiration) over some period.

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 32 9001.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Written certification confirming sod seed mix and quality:
      - 1) Include all species used.
      - 2) Include name and contact information of supplier.
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Submit one (1) copy certificate for sod seed quality and mix.

- b. Landscape Management Plan (LMP):
  - 1) Landscape Section:
    - a) Submit one (1) copy certificate for sod seed quality and mix.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Harvest, deliver, store, and handle sod in accordance with requirements of Turfgrass Producers International (TPI) (formally American Sod Producers Association) Specifications for Turfgrass Sod Materials and Transplanting / Installing.
  - 2. Schedule deliveries to coincide with topsoil operations and laying. Keep storage at job site to minimum without causing delays.
    - a. Deliver, unload, and store sod on pallets within 24 hours of being lifted.
    - b. Do not deliver small, irregular, or broken pieces of sod.
- B. Storage And Handling Requirements:
  - 1. Cut sod in pieces approximately 3/4 to one inch (19 to 25 mm) thick. Roll or fold sod so it may be lifted and handled without breaking or tearing and without loss of soil.
  - 2. During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.
  - 3. During dry weather, protect sod from drying before installation. Water as necessary to insure vitality and to prevent excess loss of soil in handling. Sod that dries out before installation will be rejected.

#### PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Description:
  - Superior sod grown from certified, high quality, seed of known origin or from plantings of certified grass seedlings or stolons:
    - a. Assure satisfactory genetic identity and purity.
    - b. Assure over-all high quality and freedom from noxious weeds or an excessive amount of other crop and weedy plants at time of harvest.
  - 2. Sod shall be composed of three varieties minimum of drought tolerant fescue and bluegrass blends.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Interface With Other Work:
  - Do not commence work of this Section until work of Sections 32 9122 and 32 9300 has been completed and approved.
- B. Tolerances:
  - 1. Final grade of soil after sodding of lawn areas is complete shall be one inch (25 mm below top of adjacent pavement of any kind.
- C. Laying of Sod:
  - 1. Lay sod during growing season and within 48 hours of being lifted.
  - 2. Lay sod while top 6 inches (150 mm) of soil is damp, but not muddy. Sodding during freezing temperatures or over frozen soil is not acceptable.
  - 3. Lay sod in rows perpendicular to slope with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp knife.
  - 4. Lay sod flush with adjoining existing sodded surfaces.
  - 5. Do not sod slopes steeper than 3:1. Consult with Architect for alternate treatment.

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- D. After Laying of Sod Is Complete:
  - 1. Roll horizontal surface areas in two directions perpendicular to each other.
  - 2. Repair and re-roll areas with depressions, lumps, or other irregularities. Heavy rolling to correct irregularities in grade will not be permitted.
  - 3. Water sodded areas immediately after laying sod to obtain moisture penetration through sod into top 6 inches (150 mm) of topsoil.

# 3.2 FIELD QUALITY CONTROL

- A. Field Inspection:
  - 1. Sodded areas will be accepted at Project closeout if:
    - a. Sodded areas are properly established.
    - b. Sod is free of bare and dead spots and is without weeds.
    - c. No surface soil is visible when grass has been cut to height of 2 inches (50 mm).
  - 2. Sodded areas have been mowed a minimum of twice.

END OF SECTION

SODDING - 3 - 32 9223

# **SECTION 32 9300 PLANTS**

#### PART 1 - GENERAL

#### 1.1 **SUMMARY**

- Includes But Not Limited To:
  - Furnish and install landscaping plants as described in Contract Documents.
- В. Related Requirements:
  - Section 32 8423: 'Underground Sprinklers' for irrigation system.
  - Section 32 9001: 'Common Planting Requirements' for:
    - Pre-installation conference held jointly with other common planting related sections.
  - Section 32 9120: 'Topsoil And Placement'. 3.
  - Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report). Section 32 9122: 'Topsoil Grading'.

  - Section 32 9219: 'Seeding'.
  - 7. Section 32 9223: 'Sodding'.

#### 1.2 **REFERENCES**

#### Definitions: Α.

- Crop Coefficients and Hydro-Zones: Crop coefficients (Kc) are used with ETo to estimate specific plant evapotranspiration rates. Crop coefficient is dimensionless number (between 0 and 1.2) that is multiplied by ETo value to arrive at plant ET (ETc) estimate. Plants grouped by water needs, organized into one irrigation zone.
- Eco-Region Irrigation Design: Bio-regional approach to irrigation and planting design that is relevant to geographic area for which planting plan and irrigation system is designed. These geographic areas are defined by Environmental Protection Agency and have been modified by the LDS Church into 15 geographical areas throughout North America, and Hawaiian Islands.
- Hardiness Zone: Hardiness zone is more precisely geographically-defined zone within an Eco-Region in which specific category of plant life is capable of growing, as defined by temperature hardiness, or ability to withstand minimum temperatures of zone. Hardiness Zones may be defined by one of two sources:
  - Sunset Western Garden Book Maps.
  - USDA Hardiness Zone Map. h.
  - Plant Hardiness zone sources shall be listed by Landscape Architect through planting and irrigation design
- Hydro-Zone: Plants grouped by water needs (similar Crop Coefficients (Kc), organized into one irrigation zone.
- Landscape Management Plan (LMP): See Section 32 9001 for definition.
- Plant Establishment Period: See Section 32 9001 for definition.
- Reference Evapotranspriation (ETo): Total water lost from the soil (evaporation) and from plant surface (transpiration) over some period.
- Reference Standards:
  - American Nursery & Landscape Association / American National Standards Institute:
    - ANLA / ANSI Z60.1-2004, 'American Standard for Nursery Stock.'

#### ADMINISTRATIVE REQUIREMENTS 1.3

- Pre-Installation Conference:
  - Participate in MANDATORY pre-installation conference as specified in Section 32 9001.

#### **SUBMITTALS** 1.4

- Action Submittals:
  - 1. Samples:

a. Top dressing mulch for approval before delivery to site.

#### B. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations And Maintenance Data:
    - 1) Submit one (1) copy of recommendations specified in Special Procedure Submittals.
  - b. Warranty Documentation:
    - 1) Include written warranty.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately.
  - 2. Do not prune before delivery, except as approved by Landscape Architect.
  - 3. Protect bark, branches, and root systems from sun scald, drying, whipping, and other handling and tying damage.
  - 4. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape.
  - 5. Provide protective covering during delivery.
- B. Storage And Handling Requirements;
  - 1. Handle balled stock by root ball or container. Do not drop trees and shrubs during delivery.
  - 2. If planting is delayed more than six hours after delivery, set planting materials in shade and protect from weather and mechanical damage.
  - 3. Set balled stock on ground and cover ball with soil, saw dust, or other acceptable material approved by Landscape Architect.
  - 4. Do not remove container-grown stock from containers before time of planting.
  - 5. Do not store plant material on pavement.
  - 6. Water root systems of trees and shrubs stored on site with fine spray. Water as often as necessary to maintain root systems in moist condition. Do not allow plant foliage to dry out.

#### 1.6 WARRANTY

- A. Special Warranty:
  - 1. Provide written warranties as follows:
    - a. Warranty shrubs, ground covers, and vines to live and remain in strong, vigorous, and healthy condition for 90 days minimum from date of Final Acceptance and meet or exceed material standards set forth in Materials heading of Part 2 of this specification.
    - b. Warranty trees to live and remain in strong, vigorous, and healthy condition and meet or exceed material standards set forth in Materials heading of Part 2 of this specification for one year from date of Final Acceptance.
    - c. When trees are completely accepted at end of warranty period, remove staking.

#### PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Plants:
  - 1. Conform to requirements of Plant List and Key on Contract Documents and to ANLA / ANSI Z60.1.
  - 2. Nomenclature:
    - a. Plant names used in Plant List conform to 'Standardized Plant Names' by American Joint Committee on Horticultural Nomenclature except in cases not covered. In these instances, follow custom of nursery trade. Plants shall bear tag showing genus, species, and variety of at least 10 percent of each species delivered to site.
  - Quality:
    - Plants shall be sound, healthy, vigorous, free from plant disease, insect pests or their eggs, noxious weeds, and have healthy, normal root systems. Container stock shall be well established and free of excessive rootbound conditions.

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- b. Do not prune plants or top trees prior to delivery.
- Plant materials shall be subject to approval by Landscape Architect as to size, health, quality, and character.
- d. Bare root trees are not acceptable.
- e. Provide plant materials from licensed nursery or grower.

#### 4. Measurements:

- a. Measure height and spread of specimen plant materials with branches in their normal position as indicated on Contract Documents or Plant List.
- b. Measurement should be average of plant, not greatest diameter. For example, plant measuring 15 inches (375 mm) in widest direction and 9 inches (225 mm) in narrowest would be classified as 12 inch (300 mm) stock.
- c. Plants properly trimmed and transplanted should measure same in every direction.
- d. Measure caliper of trees 6 inches (150 mm) above surface of ground.
- e. Where caliper or other dimensions of plant materials are omitted from Plant List, plant materials shall be normal stock for type listed.
- f. Plant materials larger than those specified may be supplied, with prior written approval of Landscape Architect, and:
  - 1) If complying with Contract Document requirements in all other respects.
  - 2) If at no additional cost to Owner.
  - 3) If sizes of roots or balls are increased proportionately.

#### 5. Shape and Form:

- a. Plant materials shall be symmetrical or typical for variety and species and conform to measurements specified in Plant List.
- b. Well grown material will generally have height equal to or greater than spread. However, spread shall not be less than 2/3's of height.

#### 2.2 ACCESSORIES

#### A. Planting Mix:

- 1. Mixture of three (3) parts excavated soil and one part well rotted composted manure, approved commercial Fertilizer:
- 1. Fertilizer for shrub and turf areas to consist of an application of 1-2 lbs of Nitrogen per 1000 square feet.

#### C. Tree Stakes:

- 1. Type Two Acceptable Products:
  - a. 2 inch (50 mm) diameter Lodgepole Pine, Douglas Fir, White Fir, or Hemlock Fir.
  - b. Equal as approved by Landscape Architect before installation. See Section 01 6200.

#### D. Tree Staking Ties:

- 1. Type Two Acceptable Products:
  - a. 32 inch (800 mm) Cinch-Tie tree ties by V.I.T. Products Inc, Escondido, CA www.vitproducts.com.
  - b. Equal as approved by Landscape Architect before installation. See Section 01 6200.

# E. Tree Guys:

- 1. Type Two Acceptable Products:
  - a. Duckbill Model 68DTS guying kit.
  - b. Equal as approved by Landscape Architect before installation. See Section 01 6200.

#### F. Pre-Emergent Herbicide:

- 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
  - a. Chipco Dimension Granular by The Andersons Inc, Maumee, IL www.andersonsinc.com.
  - b. Elanco XL2G granular by Crop Data Management Systems, Marysville, CA www.cdms.net.
  - c. Ronstar G granular by Bayer Crop Science, Monheim, Germany www.bayercropscience.com.
  - d. Surflan AS liquid by United Phosphorous Inc, Trenton, NJ www.upi-usa.com.
  - e. Oryzalin 4 A.S. liquid by FarmSaver, Seattle, WA www.farmsaver.com.

#### G. Weed Barrier:

- Type Two Acceptable Products:
  - a. DeWitt 4.1 oz (121 ml) 20 year woven polypropylene weed barrier.
  - b. Equal as approved by Landscape Architect before bidding. See Section 01 6200.

PLANTS - 3 - 32 9300

- H. Bark Or Wood Top Dressing Mulch:
  - 1. Type Two Acceptable Products:
    - a. Medium size Fir bark.
    - b. Medium or large size Redwood bark.
    - c. Shredded pine bark.
    - d. Shredded Cedar.
    - Equal as approved by Landscape Architect before installation. See Section 01 6200.

#### I. Rock Mulch:

- 1. 1" Angular Rock
  - a. Type Two Acceptable Products
    - 1) 1" Oak Creek Plum Crushed Available from Utah Landscaping Rock (435)-623-2332ph
    - 2) Equal as approved by Landscape Architect before installation.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Evaluation And Assessment:
  - 1. Before proceeding with work, check and verify dimensions and quantities. Report variations between Drawings and site to Landscape Architect before proceeding with work of this Section.
  - 2. Plant totals are for convenience only and are not guaranteed. Verify amounts shown on Contract Documents. All planting indicated on Contract Documents is required unless indicated otherwise.
  - 3. Do not commence with this Work until grading tolerances specified in Section 32 9122 'Topsoil Grading' are met.

#### 3.2 PREPARATION

- A. Plant Approval:
  - 1. Compliance:
    - a. Prior to any plant installation, evaluate plants for compliance with material standards.
    - b. Remove plants from site that do not comply.
  - 2. Inspection:
    - a. Prior to any tree installation, inspect one (1) extra deciduous tree and one (1) extra evergreen tree for root health.
    - b. In presence of Landscape Architect or by video recording, remove root container/packing material and inspect root balls for soil depth, firmness and root structure by washing soil off of roots.
    - c. If delivered plants exhibit soil 1 inch (25 mm) or more above root collar, demonstrate that all trees have had excess soil removed prior to planting or that they meet standard.
    - d. If roots are loose, significantly circling, significantly asymmetrical or damaged, all tree plant material to be removed from site and replaced.
    - e. Continue inspection process until trees meet standard.
- B. Layout individual tree and shrub locations and areas for multiple plantings:
  - 1. Stake locations and outline areas.
  - 2. Secure Landscape Architect's acceptance before planting.
  - 3. Make minor adjustments as may be requested.

#### 3.3 INSTALLATION

- A. Interface With Other Work:
  - 1. Do not commence work of this Section until work of Section 32 9122 has been completed and approved.
- B. Excavation:
  - If underground construction work or obstructions are encountered in excavation of planting holes, Landscape Architect will select alternate locations.
  - 2. Plant Excavation Size:
    - a. Diameter: Twice diameter of root ball or container minimum.
    - b. Depth: Equal to container or rootball depth.

- 3. Unless excavated material meets topsoil requirements as specified in Section 32 9113, remove from landscape areas and do not use for landscaping purposes.
- 4. Roughen sides and bottoms of excavations.
- 5. With approval of Landscape Architect, select five (5) typical planting excavations throughout site for drainage testing.
  - a. Fill selected excavations with water and verify that water drains away at rate of 3 inches (75 mm) per hour minimum. Inform Landscape Architect in writing of excavations where water does not drain properly.
  - b. Select three (3) excavations approximately 5 feet (1 500 mm) away from each non-draining excavation and repeat tests. Continue testing process until non-draining areas have been identified.
  - c. In excavations located in identified non-draining areas, auger 6 inch (150 mm) diameter hole 4 feet (1 200 mm) deep in low point of each excavation and fill with tamped planting mix.
  - d. Do not plant trees or shrubs in holes that do not properly drain.

#### C. Planting:

- 1. Removing Binders And Containers:
  - a. Remove top one / third of wire basket and burlap binders.
  - b. Remove plastic and twine binders from around root ball and tree trunk.
  - c. Remove plastic containers.
  - d. Remove wood boxes from around root ball. Remove box bottoms before positioning plant in hole. After plant is partially planted, remove remainder of box without injuring root ball.
- 2. Plant immediately after removing binding material and containers:
  - a. Place tree and shrub root balls on undisturbed soil.
  - b. After watering and settling, top of tree root balls shall be approximately two inches (50 mm) higher than finished grade and trunk flare is visible.
  - c. Shrub root balls shall be approximately one inch (25 mm) higher than finished grade.
- 3. Properly cut off broken or frayed roots.
- 4. Center plant in hole, remove remaining wire basket and burlap taking care not do damage root ball:
  - a. Replace damaged material.
  - b. Backfill with specified planting mix.
  - c. Except in heavy clay soils, make ring of mounded soil around hole perimeter to form watering basin.
- 5. Fill landscape excavations with tamped planting mix and recommended fertilizer:
  - a. Compact in 6 inch (150 mm) lifts.
  - b. Settle by watering to ensure top of root ball is 2 inches (50 mm) higher for trees and one inch (25 mm) higher for shrubs than surrounding soil following compaction and settling.
- 6. Do not use muddy soil for backfilling.
- 7. Make adjustments in positions of plants as directed by Landscape Architect.
- 8. Thoroughly water trees and shrubs immediately after planting.
- 9. At base of each tree, leave 36 inch (900 mm) diameter circle free of any grass.

# D. Supports for New Trees:

- 1. Provide new supports for trees noted on Contract Documents to be staked.
  - a. Remove nursery stakes delivered with and attached to trees.
  - b. Support shall consist of at least two (2) tree stakes driven into hole base before backfill so roots are not damaged. Place stakes vertically and run parallel to tree trunk. Install stakes so 3 feet (900 mm) of stake length is below finish grade.
  - c. Deciduous Trees:
    - Place tree ties 6 to 12 inches (150 to 300 mm) below crotch of main tree canopy. Second set of tree ties may be required 18 to 24 inches (450 to 600 mm) above finish grade, if directed by Landscape Architect.
    - 2) Remove tops of tree stakes so top of stake is 6 inches (150 mm) below main tree canopy to prevent damage to tree branches and canopy growth.
  - d. Evergreen Trees:
    - 1) Place tree ties 2/3's of height of tree up from root ball.
- 2. Provide root guying kits to support 24 inch (600 mm) box, 3 inch (75 mm) caliper and larger trees.
- 3. Staking and guying should allow some tree movement.

#### E. Vines:

1. Remove from stakes, untie, and securely fasten to wall or fence next to which they are planted.

# F. Ground Covers:

1. Container-grown unless otherwise specified on Contract Documents. Space evenly to produce a uniform effect, staggered in rows and intervals shown.

#### G. Post Planting Weed Control:

- 1. Apply specified pre-emergent herbicide to shrub and ground cover planting areas and grass-free areas at tree bases after completion of planting.
- 2. Areas shall be weed free prior to final acceptance.

#### H. Weed Barrier Fabric:

- 1. After planting and application or herbicide in shrub beds, apply covering of specified weed barrier fabric.
- 2. Achieve 100 percent coverage over ground areas while allowing space for growth from root ball.
- 3. Overlap seams 6 inches (150 mm) minimum.
- 4. Staple at 5 feet (1500 mm) on center each way and within 3 inches (75 mm) of edge of shrub bed, with two (2) at each corner.

## I. Mulching:

- 1. After application of herbicide, mulch shrub and ground cover planting areas with 3 inches (75 mm) deep layer of specified top dressing or rock mulch.
- 2. Cover grass-free area at tree bases with 3 inches (75 mm) of top dressing mulch or rock mulch.
- 3. Place mulch to uniform depth and rake to neat finished appearance.

END OF SECTION

PLANTS - 6 - 32 9300

# **NIBLEY 12 & MENDON UTAH STAKE CENTER**

# **DIVISION 33: UTILITIES:**

33 1000 Water Utilities

33 1116 Site Water Utility Distribution Piping

33 1119 Fire Suppression Utility Water Distribution Piping

33 3000 Sanitary Sewerage Utilities

33 3313 Sanitary Utility Sewerage

33 4000 Storm Drainage Utilities

33 4116 Site Storm and Irrigation Utility Drainage Piping

33 5000 Fuel Distribution Utilities

33 5100 Natural-Gas Distribution

DIVISION 33 UTILITIES

# SECTION 33 1116 SITE WATER UTILITY DISTRIBUTION PIPING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform trenching and backfilling required for work of this Section.
  - 2. Water meter not installed in building:
    - a. Furnish and install piping for domestic water supply from water main to within 5 feet of building as described in Contract Documents complete with meter, shut-off valve, and connections.
- B. Related Requirements:
  - 1. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 2. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American Welding Society:
    - a. AWS A5.8M/A5.8:2011-AMD 1 An American National Standard, 'Specification for Filler Metals for Brazing and Braze Welding'.
  - 2. ASTM International (Standard Specifications for Polyethylene (PE) pipe):
    - ASTM D2239-12a, 'Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter'.
    - b. ASTM D2737-12a, 'Standard Specification for Polyethylene (PE) Plastic Tubing'.
    - ASTM D3035-15, 'Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter'.
  - 3. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2015, 'Drinking Water System Components Health Effects'.
    - b. NSF/ANSI 372-2016, 'Drinking Water System Components Lead Content'.

# PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Thermoplastic Plastic Piping:
  - 1. Manufacturers Contact List:
    - a. PP-R Aquatherm, Inc., Lindon, UT www.aquathermpipe.com.
    - b. PP-RCT Prestan North America, Titusville, PA www.pestampipes.com.
  - 2. Materials:
    - a. Pipe: HDPE DR9 meeting ASTM and NSF requirements.
    - b. Pipe: PP-R SDR 7.4 Greenpipe faser by Aguatherm.
    - c. PP-RCT SDR 7.4 Red Stripe fiber core by Prestan.
- B. Water Meter: As required by local agency furnishing water.
- C. Connection Material:
  - 1. Thermoplastic Plastic Piping:
    - a. Factory approved fusion only.
- D. Stop And Waste Valves:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. Mueller: Mark II Oriseal stop and waste valve H10288.

b. Mueller: Buffalo screw type curb box H-10350 complete with lid and H-10349 enlarged base.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Excavate and backfill as specified in Sections 31 2316 and 31 2323 with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Contract Drawings.
  - 2. Excavate to required depth.
  - 3. Bottom of trenches shall be hard. Tamp as required.
  - 4. Remove debris from trench before laying pipe.
  - 5. Do not cut trenches near footings without consulting Architect.
  - 6. Excavate trenches so outside pipe will be at least 12 inches minimum below frost line or 48 inches minimum below finish grade, whichever is deeper.
  - 7. Backfill only after pipe lines have been tested and inspected, and approved by Architect.
- B. Install piping system so it may contract and expand freely. Eliminate completely cross connections, backflow, and water hammer.
- C. Install shut-off valve at meter.

#### 3.2 FIELD QUALITY CONTROL

- A. Field Tests
  - 1. Sterilization And Negative Bacteriological Test:
    - a. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining a pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for twenty-four (24) hours and open and close valves and faucets several times during that time.
    - b. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
    - c. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.
  - 2. Pressure Test: Before covering pipes, test system in presence of Architect or governing agency at 100 psi hydrostatic pressure for two (2) hours and show no leaks.

#### 3.3 CLEANING

A. Remove excess earth from site or place as directed by Architect.

**END OF SECTION** 

# SECTION 33 1119 FIRE SUPPRESSION UTILITY WATER DISTRIBUTION PIPING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavation and backfill required for installation of work of this Section.
  - 2. Furnish and install fire water system as described in Contract Documents.
  - 3. Furnish and install connection to water main.
- B. Related Requirements:
  - 1. Section 03 1113: 'Structural Cast-In-Place Concrete Forming' for installation of sleeve where piping penetrates slab
  - 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
    - a. Mix Type concrete mixes and admixtures.
    - b. Pre-installation conference held jointly with other concrete specifications.
  - 3. Section 21 1313: 'Wet-Pipe Sprinkler Systems'.
  - 4. Section 31 2316: 'Excavation' for procedures and quality of excavating.
  - 5. Section 31 2323: 'Fill' for procedures and quality of backfilling and compacting.

#### 1.2 REFERENCES

- A. Association Publications:
  - 1. American Water Works Association:
    - a. AWWA M41, 'Ductile-Iron Pipe Fittings' (Manual) (3rd Edition 2009).
- B. Reference Standards:
  - 1. American Water Works Association:
    - a. AWWA C110/A21.10-12, 'Ductile-Iron and Gray-Iron Fittings'.
    - b. AWWA C111/A21.11-12, 'Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings'.
    - c. AWWA C150-A21.50-14, 'Thickness Design of Ductile-Iron Pipe'.
    - d. AWWA C151/A21.51-09, 'Ductile-Iron Pipe, Centrifugally Cast'.
    - e. AWWA C502-14 'Dry-Barrel Fire Hydrants'.
    - f. AWWA C606-10, 'Installation of Ductile-Iron Water Mains and Their Appurtenance'.
    - g. AWWA C900-07, 'Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm) for Water Transmission and Distribution'.
  - 2. ASTM International:
    - a. ASTM A126-04(2014), 'Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings'.
    - b. ASTM A197/A197M-00(2015), 'Standard Specification for Cupola Malleable Iron'.
    - c. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength'.
    - d. ASTM A506-16, 'Standard Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled'.
    - e. ASTM A575-96(2013), 'Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades'.
  - 3. National Fire Protection Association:
    - a. NFPA 13: 'Standard for the Installation of Sprinkler Systems' (2016 Edition or latest edition approved by AHI)
      - 1) Contractor's Material & Test Certification for Underground Piping'.
    - b. NFPA 24 'Standard for the Installation of Private Fire Service Mains and Their Appurtenances' (2016 Edition or latest edition approved by AHJ).
  - 4. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2015, 'Drinking Water System Components Health Effects'.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.

#### 1.4 SUBMITTALS

- A. Informational Submittals:
  - Certificates:
    - a. Provide one (1) copy of completed NFPA 13 'Contractor's Material and Test Certification for Underground Piping' as specified in 'Field Quality Control' in Part 3 of this specification:
- B. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - Signed NFPA 13 'Contractor's Material and Test Certification for Underground Piping' with 'In-Building Riser' information included.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Install exterior fire water system according to NFPA 13, NFPA 24, and AWWA Manual M41, 'Ductile-Iron Pipe and Fittings' procedures unless specified otherwise below.
  - 2. Install hydrant in accordance with AWWA C502.
  - 3. Install exterior fire water system up to and including pipe flange 12 inches above floor inside building.
  - 4. Bury fire service mains at least 6 inch deeper than municipal water works piping. Additional depth of cover is necessary because of lack of water circulation in fire service mains.

#### PART 2 - PRODUCTS

# 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Ames Fire & Waterworks (A Watts Brand), Woodland, CA www.amesfirewater.com.
    - b. Ipex Inc, Englewood, CO www.ipexinc.com.
    - c. Mueller Company, Decatur, IL www.muellerflo.com.
    - d. Nibco Inc. Elkhart, IN www.nibco.com.
    - e. Potter Electric Signal Company, St Louis, MO www.pottersignal.com.
    - f. Potter-Roemer, Santa Ana, CA www.potterroemer.com.

### B. Materials:

- 1. Pipe:
  - a. PVC meeting AWWA C900 requirements:
    - 1) Blue-Brut by Ipex Inc.
    - 2) Blue Brute by JM Eagle.
  - b. Fittings: Ductile iron pipe fitting in accordance with AWWA C110 and rubber gaskets joints in accordance with AWWA C111/A21.11.
- 2. Hydrants:
  - a. Dry-barrel fire hydrant (base valve type) complying with AWWA C150-A21.50, with 150 psi working pressure with two 2-1/2 inch hose connections and one 4-1/2 inch pumper connection with caps and chains.
  - b. Nozzle cap nuts to match operating stem nuts.
  - c. Minimum 6 inch supply pipe.
  - d. Class Two Quality Standard. See Section 01 6200:
    - 1) Hydrants accepted by authority having jurisdiction are approved.
- 3. Gate Valves:
  - a. Cast iron body with bolted bonnet.

- b. Indicator post pattern.
- c. Non-rising stem.
- d. 175 psi working pressure.
- e. Category Four Approved Products. See Section 01 6200 for definition of Categories:
  - 1) Nibco:
    - a) Model M-609 with mechanical connection.
    - b) Model F-609 with flanged connection.
  - 2) Mueller:
    - a) Model A-2052-5 with mechanical connection.
    - b) Model A-2052-6 with flanged connection.
- 4. Tamper Switch:
  - a. UL/ULC listed and FM approved.
  - b. Weather and tamper resistant.
  - c. Single Pole Double Throw Switch.
  - d. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - 1) Potter Electric Signal: Model PCVS.
- 5. Anchorages:
  - a. Provide anchorages for tees, plugs, caps, bends, and hydrants in accordance with NFPA 24.
  - b. Miscellaneous Fittings:
    - 1) Clamps, Straps, And Washers: Steel, meeting requirements of ASTM A506.
    - 2) Rods: Steel, meeting requirements of ASTM A575.
    - 3) Rod Couplings: Malleable iron, meeting requirements of ASTM A197/A197M.
    - 4) Bolts: Steel, meeting requirements of ASTM A307.
    - 5) Cast Iron Washers: Meeting requirements of ASTM A126, Class A.
    - 6) Thrust Block: 2500 psi concrete.
- 6. In-Building Riser:
  - Meet NSF International Standards for Lead Free, NSF 61-G certified, 200 psi maximum pressure and one piece.
  - b. UL/ULC listed and FM approved.
  - c. AWWA C900 Inlet/DIP and AWWA C606 Outlet.
  - d. Corrosion resistant stainless steel construction, type 304.
  - e. Includes test cap and coupler.
  - f. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - 1) In-Building Riser (Series IBC) by Ames:
      - a) Size to match project requirements.
- 7. Pipe Sleeve at slab penetration:
  - a. Class Two Quality Standard. See Section 01 6200:
    - 1) Any material rigid enough to resist deformation when concrete poured.
    - 2) Size: Provide 2 inch minimum space between piping assembly and sleeve.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

A. Before installation, inspect pipe for defects and cracks. Do not use defective, damaged, or unsound pipe.

#### 3.2 PREPARATION

- A. Excavate and backfill as specified in Sections 31 2316 and 31 2323 with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Contract Documents.
  - 2. Excavate to required depth:
    - a. Depth at least 12 inches deeper than frost line.
  - 3. Grade to obtain fall required.
  - 4. Bottom of trenches shall be hard and smooth. Tamp as required.
  - 5. Remove debris from trench prior to laying of pipe.
  - 6. Do not cut trenches near footings without consulting Architect.
  - 7. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 48 inches minimum below finish grade, whichever is deeper.
  - 8. Cover pipe only after testing is complete and accepted by Architect.

#### 3.3 INSTALLATION

#### A. General:

- 1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
- Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
- B. Placing And Laying of Underground Pipe:
  - 1. Install top of Fire Suppression Utility Water Distribution piping at least 6 inches below frost line (protects from freezing due to water not moving).
  - 2. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed 6/D inches per linear foot of pipe where D represents nominal diameter of pipe expressed in inches.
  - 3. Deflections to be determined between center lines extended of two connecting pipes.
  - 4. If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.
  - 5. Laying:
    - a. Place 18 gage yellow tracer wire along side when installing C900 pipe:
      - Tracer wire shall run from water main isolation valve to and past all connections, to PIV and each fire hydrant and fire riser.
    - b. Shape trench bottom to give substantially uniform circumferential support to lower third of each pipe.
    - c. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
    - d. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
    - e. Support fittings at bends in pipe line by concrete thrust blocks firmly wedged against vertical face of trench. Blocks shall be at least two cu ft in size.
    - f. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.
- C. Make joints between ductile iron and cast iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.
- D. Provide cast iron valve box for fire protection valve. Encase valve box in concrete.
- E. Install In-Building Riser:
  - 1. Connect vertical leg must extend 12 inches above finished floor.
  - 2. Horizontal leg must extend at least 3 feet out from foundation.
  - 3. Provide 2 inch minimum clearance around pipe at penetration through floor.
  - 4. Fill clearance with mastic.
- F. Make joints between ductile iron and other types of pipe with standard manufactured adapters and fittings. Make connections between new work and existing mains using specials fittings to suit actual conditions.
- G. Incidental Items of Work:
  - 1. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.
  - 2. Make key for unlocking valve handle identical to key used to open doors to building.
- H. Fire Hydrant Color-Code:
  - 1. Laps and Nozzle caps should be painted IAW NFPA 24:
    - a. Less ten 500 gpm: Red
       b. 500 to 999 gpm: Orange
       c. 1000 to 1499 gpm Green
       d. 1500 gpm and above Light Blue

# 3.4 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Test system according to NFPA 13 (2010, 2013, and 2016), figure 10.10.1, 'Contractor's Material and Test Certification for Underground Piping':
    - a. Provide signed copy of certificate with field test information with Closeout Submittals:
      - Certificate to include following information in 'Additional explanation and notes' area of certificate with following:
        - a) In-Building Riser: Manufacturer brand, size, material and size of trust blocking.

END OF SECTION

# SECTION 33 3313 SANITARY UTILITY SEWERAGE

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavating and backfilling required for work of this Section.
  - 2. Furnish and install sanitary sewage system as described in Contract Documents beginning at 5 feet from where it enters building and connecting to serving sewer system.

#### B. Related Requirements:

- 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
  - a. Pre-installation conference held jointly with concrete specifications.
- 2. Section 22 1313: 'Facility Sanitary Sewers' for sanitary sewage system within building and within 5 feetof building.
- 3. Section 31 0501: 'Common Earthwork Requirements' for:
  - a. Pre-installation conference held jointly with other common earthwork related sections.
- 4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
- 5. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.
  - 2. Participate in pre-installation conference as specified in Section 31 0501.

#### 1.3 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A74-16, 'Standard Specification for Cast Iron Soil Pipe and Fittings'.
    - b. ASTM A888-15, 'Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications'.
    - c. ASTM C564-14, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'.
    - d. ASTM C1277-15, 'Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings'.
    - e. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
    - f. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
    - g. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - h. ASTM D2661-14, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - ASTM D2665-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - ASTM D3034-15, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - k. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
  - 2. International Code Council:
    - a. ICC IPC-2015, 'International Plumbing Code'.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals
  - 1. Install cleanouts in accordance with local governing authority and State codes.

#### PART 2 - PRODUCTS

#### 2.1 COMPONENTS

#### A. ABS:

 ABS Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D2661 joined with pipe cement meeting requirements of ASTM D2235.

#### B. PVC:

- 1. Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D2665 joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
- 2. Gasket joint gravity sewer pipe and fittings meeting requirements of ASTM D3034. Joints shall be integral wall and elastomeric gasket.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Before installation, inspect pipe for defects and cracks.
  - 2. Do not use defective, damaged, or unsound pipe.

#### 3.2 PREPARATION

- A. Excavate and backfill as specified in Sections 31 2316 and Section 31 2323 with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Contract Drawings.
  - 2. Excavate to required depth and grade to obtain fall required.
  - 3. Bottom of trenches shall be hard. Tamp as required.
  - 4. Remove debris from trench before laying pipe.
  - 5. Do not cut trenches near footings without consulting Architect/Engineer.
  - 6. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 48 inches minimum below finish grade, whichever is deeper.

#### 3.3 INSTALLATION

#### A. General:

- 1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
- Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
- 3. Trench width at top of pipe:
  - a. Minimum: 18 inches or diameter of pipe plus one foot, whichever is greater.
  - b. Maximum: Outside diameter of pipe plus two feet.
- B. Placing And Laying of Underground Pipe:
  - 1. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed 6/D inches per linear foot of pipe where D represents nominal diameter of pipe expressed in inches
  - 2. Deflections to be determined between center lines extended of two connecting pipes.
  - If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.

- 4. Laying:
  - a. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
  - b. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
  - c. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.
- 5. Make joints between cast iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.
- 6. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.

# C. Thermoplastic Pipe And Fittings:

- 1. Install in accordance with Manufacturer's recommendations and ASTM D2321.
- 2. Stabilize unstable trench bottoms.
- 3. Bed pipe true to line and grade with continuous support from firm base.
  - a. Bedding depth: 4 to 6 inches.
  - b. Material and compaction to meet ASTM standard noted above.
- 4. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
- 5. Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
- 6. Do not use back hoe or power equipment to assemble pipe.
- 7. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
- 8. Minimum cover over top of pipe:
  - a. 36 inches before allowing vehicular traffic over pipe.
  - b. 48 inches before use of compaction equipment other than hand or impact tampers.

# 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Failure to install joints properly shall be cause for rejection and replacement of piping system at no additional cost to Owner.

END OF SECTION

# SECTION 33 4116 SITE STORM UTILITY DRAINAGE PIPING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavating and backfilling required for work of this Section.
  - 2. Furnish and install storm drainage system as described in Contract Documents from point of water collection to terminating point.
  - 3. Furnish and install piping of existing ditch and Nibley City street right-of-way as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 2. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

#### 1.2 REFERENCES

- A. Reference Standards:
  - 1. American Association Of State Highway And Transportation Officials:
    - a. AASHTO M 252-09 (2012), 'Standard Specification for Corrugated Polyethylene Drainage Pipe'.
    - b. AASHTO M 294-15, 'Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter'.
  - 2. ASTM International:
    - a. ASTM C76-15a, 'Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe'.
    - b. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
    - c. ASTM D3034-15, 'Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - d. ASTM D3212-07(2013), 'Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals'.
    - e. ASTM F794-03(2014), 'Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter'.
    - f. ASTM F1336-15, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings'.

#### PART 2 - PRODUCTS

#### 2.1 SYSTEM

- A. Materials:
  - 1. Bedding Material: 3/8 inch crushed gravel.
  - 2. Catch Basins, Curb Inlets, etc.:
    - a. Concrete:
      - 1) Construct of 5000 psi minimum concrete.
      - 2) Include cover inlet with cast iron frame and grate as shown on Drawings.
    - o. PVC:
      - 1) Comply with requirements of ASTM D3212, ASTM F794, and ASTM F1336.
      - 2) Metal grates, Frames, and hoods shall comply with ASTM A536, Grade 70-50-05.
      - 3) Type One Acceptable Products:
        - a) Nyloplast-ADS, Buford, GA (866) 888-8479. www.nyloplast-us.com.
        - b) Equal as approved by Architect before bidding. See Section 01 6200.
  - 3. Concrete Pipe:
    - a. Non-Reinforced: Meet requirements of ASTM C14 or ASTM C14M.
    - b. Reinforced:

- 1) Meet requirements of ASTM C76, plain end.
- 2) Determine class of pipe by depth of cover over pipe at rough-graded elevations as follows:
  - ) Depth Of Cover Class Of Pipe
  - b) Under 2 feet V
    c) 2 feet to 3 IV
    d) 3 feet to 6 feet III
    e) Over 6 feet II
- 4. PVC Pipe And Fittings:
  - a. Meet requirements of ASTM D3034, SDR 35.
  - b. Fittings: Slip Joint type with elastomeric seals.
- 5. Fittings: Slip Joint type with elastomeric seals.

#### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Excavate and backfill as specified in Section 31 2316 and Section 31 2323 with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Contract Documents.
  - 2. Excavate to required depth.
  - 3. Grade to obtain fall required.
  - 4. Remove debris from trench before laying bedding and pipe.
  - 5. Do not cut trenches near footings without consulting Architect.
  - 6. Backfill only after pipe lines have been tested, inspected, and approved by Architect/Engineer.

#### 3.2 INSTALLATION

- A. Concrete Pipe:
  - 1. Provide 3 inches of uncompacted bedding material below pipe.
  - 2. After installation of pipe, provide additional bedding material up to springline of pipe.
- B. PVC Pipe:
  - 1. Install in accordance with ASTM D2321.
- C. Use jacks to make-up gasketed joints.

#### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Failure to install joints properly shall be cause for rejection and replacement of piping system at no additional cost to Owner.

# 3.4 CLEANING

A. Remove excess earth from site or place as directed by Architect.

### END OF SECTION

# SECTION 33 5100 NATURAL-GAS DISTRIBUTION

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Perform excavation and backfill required for work of this Section.
  - 2. Furnish and install gas piping and fittings as described in Contract Documents from gas main to meter.
  - 3. Provide, make necessary arrangements for, and pay necessary fees to local gas utility company for gas service lines and proper size gas meter.
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for concrete meter base.
  - 2. Section 05 0523: 'Metal Fastening' for welding standards and requirements.
  - 3. Section 31 2316: 'Excavation' for procedure and quality of excavating.
  - 4. Section 31 2323: 'Fill' for procedure and quality of backfilling and compacting.

#### 1.2 REFERENCES

- A. Reference Standards:
  - ASTM International:
    - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
    - ASTM A234/A234-15, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
    - c. ASTM D2513-14, 'Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings'.

# 1.3 SUBMITTALS

- A. Informational Submittals:
  - 1. Certificates:
    - a. Welder certificates certifying welders comply with requirements specified under Quality Assurance Article of this Section.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Lay underground pipe in accordance with federal pipeline safety regulations and local gas utility company regulations and specifications.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Polyethylene Pipe Installers:
    - a. Properly trained and certified in procedure for joining polyethylene pipe.
  - 2. Welders:
    - a. Certified and bear evidence of certification 30 days before commencing work on project.
    - b. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test.
    - c. This shall be done at no cost to Owner.
    - d. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.

# 1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage And Handling Requirements:

1. Do not store polyethylene pipe so it is exposed to sunlight.

#### PART 2 - PRODUCTS

#### 2.1 COMPONENTS

- A. Above-Ground Pipe And Fittings:
  - 1. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of ASTM A53/A53M.
  - 2. Welded forged steel fittings meeting requirements of ASTM A234/A234M.
- B. Below-Ground Pipe And Fittings:
  - 1. Polyethylene pipe and fittings meeting requirements of ASTM D2513 with No. 14 coated copper tracer wire.
- C. Valves:
  - 1. Iron body, 125 psi square head cock, with bronze plug.
  - 2. Class One Quality Standard: Powell No. 2200:
    - a. Crane Valves, Long Beach, CA www.cranevalve.com or Crane Canada Inc, Plumbing Div, Montreal, QB (514) 735-3592.
    - b. The Powell Co, Cincinnati, OH www.powellvalves.com.
    - c. Stockham Valve, Birmingham. AL www.stockham.com.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Excavate and backfill as specified in Section 31 2316 and 31 2323 with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Contract Drawings.
  - 2. Excavate to required depth.
  - 3. Bottom of trenches shall be hard. Tamp as required.
  - 4. Remove debris from trench before laying pipe.
  - 5. Do not cut trenches near footings without consulting Architect.
  - 6. Place 4 inches of sand around pipe before trench is backfilled.
  - 7. Bury outside pipe 12 inches minimum below frost line or 48 inches minimum below finish grade, whichever is deeper.
  - 8. Backfill only after pipe lines have been tested, inspected, and approved by Architect.
- B. General installation shall be as specified in Division 23:
  - 1. Steel pipe 2-1/2 inches and larger shall have welded fittings and joints.
  - Provide 24 inch minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of service line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
  - 3. Place tracer wire along side of polyethylene pipe from meter to main.
- C. Set meter on concrete base.

# 3.2 PROTECTION

A. Provide necessary protection against damage for meter.

#### **END OF SECTION**