# OGDEN HIGH SCHOOL BASEBALL FIELD RENOVATION

2828 HARRISON BLVD, OGDEN, UT 84403

## OGDEN SCHOOL DISTRICT

### CONSTRUCTION DOCUMENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS TECHNICAL SPECIFICATION DIVISIONS 1 - 33 APPENDIX

MHTN PROJECT NO. 2022539 18 AUGUST 2022



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### Instructions to Bidders

#### for the following PROJECT:

(Name and location or address): sample 1

#### THE OWNER:

(Name and address):

#### THE ARCHITECT:

(Name and address):

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#### **ADDITIONS AND DELETIONS:**

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

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

#### **ARTICLE 1 DEFINITIONS**

- § 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.
- § 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.
- § 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.
- § 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- § 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.
- § 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.
- § 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- § 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.
- § 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

#### ARTICLE 2 BIDDER'S REPRESENTATIONS

- § 2.1 The Bidder by making a Bid represents that:
- § 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.
- § 2.1.2 The Bid is made in compliance with the Bidding Documents.
- § 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.
- § 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

# ARTICLE 3 BIDDING DOCUMENTS § 3.1 COPIES

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

- § 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.
- § 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- § 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

#### § 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- § 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.
- § 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.
- § 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

#### § 3.3 SUBSTITUTIONS

- § 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
- § 3.3.2 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
- § 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
- § 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

#### § 3.4 ADDENDA

- § 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.
- § 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- § 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.
- § 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

#### ARTICLE 4 BIDDING PROCEDURES

#### § 4.1 PREPARATION OF BIDS

- § 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.
- § 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.
- § 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.
- § 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.
- § 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."
- § 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.
- § 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

#### § 4.2 BID SECURITY

- § 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.
- § 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.
- § 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

#### § 4.3 SUBMISSION OF BIDS

- § 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.
- § 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.
- § 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.
- § 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

#### § 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

- § 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.
- § 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.
- § 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

# ARTICLE 5 CONSIDERATION OF BIDS § 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

#### § 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

#### § 5.3 ACCEPTANCE OF BID (AWARD)

- § 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.
- § 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

#### **ARTICLE 6 POST-BID INFORMATION**

#### **§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT**

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

#### § 6.2 OWNER'S FINANCIAL CAPABILITY

The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration and no later than seven days prior to the expiration of the time for withdrawal of Bids, furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

#### § 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

- § 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.
- § 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

# ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND § 7.1 BOND REQUIREMENTS

- § 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.
- § 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.
- § 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

#### § 7.2 TIME OF DELIVERY AND FORM OF BONDS

- § 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.
- § 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.
- § 7.2.3 The bonds shall be dated on or after the date of the Contract.
- § 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

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

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

# Additions and Deletions Report for

AIA<sup>®</sup> Document A701<sup>™</sup> – 1997

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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PAGE 1

sample 1

**User Notes:** 

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# Certification of Document's Authenticity

AIA® Document D401™ - 2003

I, , hereby certify, to the best of my knowledge, information and belief, that simultaneously with its associated Additions and Deletions Report and this cunder Order No. 1000381962_1 from AIA Contract Documents software and document I made no changes to the original text of AIA® Document A701 <sup>TM</sup> published by the AIA in its software, other than those additions and deletions Deletions Report.	ertification at 16:12:16 on 01/13/2009 d that in preparing the attached final 1 – 1997 - Instructions to Bidders, as
(Signed)	
(Title)	
(Dated)	

### **OGDEN SCHOOL DISTRICT**

1950 Monroe Blvd Ogden, UT 84401 801-737-7300

**REQUEST FOR PROPOSAL** 

TO PROVIDE

**CONSTRUCTION SERVICES** 

FOR

OGDEN HIGH SCHOOL BASEBALL FIELD RENOVATION

LOCATED AT 2828 Harrison Blvd Ogden, UT 84403

RELEASE DATE: Wednesday, 18 August 2022

DUE DATE: September 1, 2022 2:00 PM – Ogden School District Offices

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#### REQUEST FOR PROPOSAL

#### I. GENERAL

#### A. Intent for Request for Proposal

The purpose of this Request for Proposal is to solicit competitive proposals from qualified general construction companies for:

#### OGDEN SCHOOL DISTRICT

Ogden High School Baseball Field Renovation 2828 Harrison Blvd, Ogden, UT 84403

#### B. Standard Contract Terms and Conditions

The successful contractor shall be required to execute AIA Contract Document A101-2007 with all Terms and Conditions contained therein.

#### **Contract Period**

This agreement shall commence on the date the contract is fully executed by the parties and shall continue for one (1) year beyond substantial completion. Construction time period is noted in the construction documents.

#### C. Bid Requirements

- 1. By signing their Bid, the Contractor certifies the following:
  - a.) CONFLICT OF INTEREST: Contractor certifies that it has not offered or given any gift or compensation prohibited by the laws of the State of Utah to any officer or employee of the state or participating political subdivision to secure favorable treatment with respect to being awarded this contract.
  - b.) NON-COLLUSION: By signing the bid, the bidder certifies that the bid submitted has been arrived at independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other vendor of materials, supplies, equipment or services described in the invitation to bid, designed to limit independent bidding or competition.
  - c.) **DEBARMENT:** The contractor certifies that neither the company nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction (contract) by any governmental department or agency. <u>If</u>

the contractor cannot certify this statement, attach a written explanation for review by the District.

#### d.) Non-Discrimination Requirements

The proposing firm must comply, at all times during the solicitation and contracting period, with all applicable Federal, State, County and City anti-discrimination laws, ordinances, rules, and regulations. Any violations of this provision shall be considered a violation of a material provision of the solicitation process or contract and shall be grounds for disqualification, cancellations, termination, or suspension.

#### e.) Other Requirements

#### 1.) Conform to Response Form Guidelines

All offered information must be submitted on the Proposal Response forms found in Section V.

#### 2.) Proposals Submitted on a Timely Basis

A digital copy of the proposal shall be submitted to Sciquest on or before September 1, 2022 @ 2:00 p.m. Mountain Standard time.

Any proposal received after the due date and time will be deemed non-responsive and will not be considered for evaluation. *Faxed or emailed copies will not be accepted.* 

#### D. Proposal Calendar

Date: 19 August 2022 Documents Released

Date: 1 Sept 2022 Proposals due. Submit proposals - in Two (2)

separate PDF documents: (1) - Schedules

A, B & E. (2) - Schedules C & D is to be submitted no later than 2:00 p.m. Mountain Standard Time.

Date: 25, August 2022 Mandatory Pre-Bid Walk Through at 11 AM, Ogden High

School, 2828 Harrison Blvd, Ogden, UT 84403. Meet at

south side of Baseball Field.

Date: 12 Sept 2022 Evaluation of Proposals. The District may

request formal written clarification on any item, schedule oral discussions, and/or request best and final offers if deemed

necessary.

Date: 15 Sept 2022 Recommendation given to the Board of

Education for approval.

#### E. Evaluation Criteria

The following criteria and weighting will be used to evaluate the proposals. The more complete the information the higher the possible score. The award will be made to the respondent whose proposal scores highest overall based on the following criteria:

#### 1. 5 POINTS Responsiveness

The completeness and conformity of the proposal response to the RFP requirements. Including but not limited to:

Schedule A - Complete with Bid Bond and Contractor's License.

Failure to include a bid bond with the proposal shall disqualify the proposal from further consideration.

Schedule B - Complete.

Schedule C - Complete.

Schedule D - Complete with Bid Form complete.

Schedule E - Complete.

#### 2. 20 POINTS Organization/Construction Team

The administrative and functional structure including personnel, respondent's ability to perform, the number of personnel committed to each project and response time after first request, the description of the offeror's local facilities and capability to comply and meet schedules. A list of sub-contractors is part of these criteria. (Schedule B and Schedule C)

#### 3. 20 POINTS Experience/Expertise

This includes the technical qualifications and work experience of key personnel assigned to work with the District. This also includes past experience on similar projects. (Schedule B)

#### 4. 35 POINTS Construction Cost

This includes the costs for the entire project as submitted on the RFP form. (Schedule D) Note that the low bid may not receive the highest points in this category, if in the opinion of the selection committee, the cost does not properly reflect the cost of labor and materials required to construct the project.

# 5. **20 POINTS References/Past Performance** (Schedule E)

#### F. Ogden School District Contacts

All inquiries relative to this Request for Proposal must be directed to:

Ken Crawford Director of Support Services Ogden County School District 1950 Monroe Blvd., Ogden, UT 84401

801-737-7376

No other Ogden School District employee, Board Member, or evaluation committee member shall be contacted concerning this RFP during the procurement and selection processes. Failure to comply with this requirement will result in disqualification.

#### G. Questions Regarding the Bid Documents or Proposed Substitutions

All questions regarding the Bid Documents or Proposed Substitutions must be submitted through SciQuest online.

#### H. Right of Rejection

The Board of Education reserves the right to reject any and all proposals or to waive any non-statutory informality. The Board of Education further reserves the right to make the contract award deemed by the Director of Purchasing and the selection committee to be in the best interest of the District. The Board's decision to accept or reject the contract shall be final.

#### I. Addendum to RFP

If it becomes necessary to revise this RFP in whole or in part, an addendum will be provided through the Architect's Office to all offerors of record who received the original RFP.

#### J. Firm Proposal

An official of the general construction company authorized to bind the company must sign proposals and proposal must be firm for a period of sixty (60) days from the due date.

#### II. PROPOSED SERVICES

#### A. Construction

Construction shall meet all requirements of documents issued by MHTN Architects Inc., with accompanying drawings, specifications and addenda

#### B. One Year Warranty Inspection

The General Contractor will be required to visit the site one year after Substantial Completion with the assigned representative of the District and the Architect to review warranty issues. A Warranty Punch List will be issued and the General Contractor will be responsible to complete these warranty items. Additional inspections will take place as required to satisfactorily complete warrantee punch list items.

#### C. Schedule

The successful contractors must review and familiarize themselves with the required project completion date as it pertains to the performance of their work. Liquidated damages will be assessed upon failure to complete the project on or before the stipulated date in the construction documents.

Contractor shall provide a critical path schedule at the time of the contract signing showing how completion dates will be met and updated as required by the Owner and Architect throughout the construction period

#### III. INSURANCE

Ogden School District will provide Builders Risk Insurance.

#### IV. BID BOND AND COPY OF CONTRACTOR'S LICENSE

#### A. Bid Bond

Contractors are required to submit with their proposal a certified/cashier's check or bid bond of not less than 5% of their proposal amount payable to the order of the Ogden School District Board of Education. The check or bid bond of the accepted contractor shall be forfeited in case the contractor fails or refuses to enter into a contract or furnish a performance bond and material and labor payment bond in the amount of 100% of the proposal amount as required by Ogden School District.

#### B. Contractor's License

A copy of the Contractor's Utah license shall also be part of this RFP submittal.

#### I. PROPOSAL RESPONSE FORMS

The respondent must use the following schedules, or copies thereof, in submitting a proposal. The schedules shall be completed in their entirety. Other materials that support these schedules may be included in the proposal document at the respondent's discretion.

Schedule A Schedule B Schedule C Schedule D Schedule E	Bid Bond & License Organization/Construction Team Sub-Contractor List Construction Cost Form References/Past Performance
Bid Bond - AIA A3	10
Copy of Contracto	r's License – State of Utah

The undersigned certifies that the information contained herein is true, and complete, so as not to be misleading.

PART 1 - GENERAL INFORMATION
Company Submitting Statement:
Principal Office Address:
(Include City, State and Zip Code)
Telephone Number:FAX Number:
Principal Officer:Title:
Type of Business: ☐ Corporation ☐ Partnership ☐ Individual ☐ Other
Years In Business:
Number of Employees:Currently 2008 2007 2006
Utah License Number (s):
Federal Identification Number:
License Trade Category(ies):
List licensed categories of work that your firm performs with own forces:
Has your organization or any of its officers been involved in any judgments, claims, arbitration proceedings or suits during the last seven years?

If yes, attach explanation on a separate sheet.

#### PART 2 - STAFF - Construction Team

For key supervisory personnel and field superintendents in your organization who are to be assigned to District construction projects, list their specific construction experience, which directly relates to this Ogden School District project and attach their resumes.

Company Name:			
Proposed Project M	lanager:		
Present Commitme	Present Commitments:Date Available:		
Proposed Field Sup	erintendent:		
Present Commitme	nts:	Date Available:	
PART 3 - REFERENCES - Construction Team			
	Name of Company	Phone Numbers	
Project Manager: _			
_		<u> </u>	
Field Superintender	nt:		

Organization/Construction Team

#### PART 4 - SIGNATURE

We have read the Ogden School District Request for Proposal and fully understand its intent. We certify that we have adequate personnel and resources to fulfill the proposal requirements. We further understand that our ability to meet the criteria and provide the required services shall be judged solely by the District.

We further certify that since the receipt of the Request for Proposal, no contact, discussion, or negotiation has been made nor will be made regarding this proposal for construction services for the Ogden High School Baseball Field Renovation, Ogden, Utah project with any Ogden School District employee or Board member other than the listed contact people in the RFP. We understand that any such contact could disqualify this proposal.

We further certify that we are properly licensed to conduct business with the scope of this Request for Proposal in the State of Utah.

We certify that all schedules and addenda contained herein shall be considered part of the entire RFP response and that the complete document submitted shall be considered a legally binding document.

Dated this	day of	2016.
The undersigned swears ar accurate, and complete so	nd deposes that the information as not to be misleading.	provided herein is true,
Name of Organization:		
Signature:		
Printed Name:		
Title:		

Subcontractor List

The General Contractor shall submit the following list of all sub-contractors included in their bid proposal that are providing labor and materials for sub-contract work listed below. This list shall be submitted with the Proposal. Provide a base bid amount for each line item listed. Do NOT combine like items unless specifically combined on this list. All base bid amounts must be completed. Failure to complete this list in its entirety shall make the entire proposal non-responsive.

A list of all School Projects for which the listed sub-contractors have provided similar work in the last five (5) years shall also be provided to ensure the sub-contractor's capability to provide required work for this project. Include the project name, total area of facility in square feet, date of completion and Owner. Provide references for subcontractors listed on Form provided in Schedule E herein.

General Contractors listing themselves to self perform work identified herein shall also list the name of the Firm's employee who will act as foreman for said work, with references for the foreman.

Amounts listed herein shall be a part of the schedule of values submitted by the successful General Contractor with each monthly payment request.

The General Contractor may propose a substitute sub-contractor if desired. List the proposed subcontractor in the location provided on this form. The proposed substitution will not be evaluated as part of the General Contractor's original bid number. The cost of the proposed substitution will only be deducted or added to the final contract amount of the selected General Contractor at the time of contract signing. The reasons for the proposed substitution(s) shall be attached to the sub- contractor list.

#### SITE AND BUILDING COSTS

Description	Name	Amount	Substitution Amount
Site Demolition			
Sub-Contractor:		\$	
Proposed Sub-Contractor:			\$
Building Demolition			
Sub-Contractor:		\$	
Proposed Sub-Contractor:			\$
Concrete & Reinforcing			
Sub-Contractor:		\$	
Proposed Sub-Contractor:			\$
Unit Masonry			
Sub-Contractor:		\$	

		Subcontractor List
Proposed Sub-Contractor:		\$
Structural Steel (including Erection Labor)		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Metal Fabrications / Railings		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Rough Carpentry, Trusses & Sheathing		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Interior Architectural Woodwork		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Water Repellants & Anti-Graffiti Coating		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Metal Wall, Roof & Soffit Panels		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Flashing & Sheet Metal		
Sub-Contractor:	<u> </u>	
Proposed Sub-Contractor:		\$
Joint Sealers		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Steel Doors & Frames		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Overhead Coiling Doors		
Sub-Contractor:	\$	

## Ogden School District Request for Proposal Ogden High School Baseball Field Renovation

Schedule C

		Subcontractor List
Proposed Sub-Contractor:		\$
Windows & Glazing		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Gypsum Board Assemblies		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Painting		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Fire Extinguishers		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Plumbing System		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Electrical Power Distribution		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Interior & Exterior Lighting		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Structured Cabling		
Sub-Contractor:	\$	
Proposed Sub-Contractor:	<u> </u>	\$
Audio / Visual System		
Sub-Contractor:	\$	
Scoreboards		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Earthwork		
Sub-Contractor:	<u> </u>	

		Subcontractor List
Proposed Sub-Contractor:		<u></u> \$
Storm Drainage		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		
Site Utilities Sub-Contractor:  Proposed Sub-Contractor:	\$	
Concrete Paving		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		
Concrete Mow Strip		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Backstop / Netting		
Sub-Contractor:	<u> </u>	
Proposed Sub-Contractor:		\$
Chain Link Fencing		
Sub-Contractor:	<u> </u>	
Proposed Sub-Contractor:		\$
Exterior Sports Equipment		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Irrigation Systems		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Plantings / Sod		
Sub-Contractor:	\$	
Proposed Sub-Contractor:		\$
Warning Track & Pitcher Clay		
Sub-Contractor:	<u>\$</u>	
Proposed Sub-Contractor:		\$
Infield Soils		
Sub-Contractor:	\$	

## Ogden School District Request for Proposal Ogden High School Baseball Field Renovation

Schedule C

Proposed Sub-Contractor:		Subcontractor List \$
General Conditions	 \$	
Total Base Bid	 \$	
Alternate No. 1 - Announcer Booth Building	 \$	
Alternate No. 2 - Synthetic Grass Surfacing at Infield	\$	
Alternate No. 3 - Chain Link Fence at Backstop in Lieu of Tension Ball Safety Netting	\$	
Total Alternates	\$	

Ogden School District Request for Proposal Ogden High School Baseball Field Renovation Schedule D

Construction Cost Form

TO: Ogden School District 1950 Monroe Blvd Ogden, UT 84401

PROJECT: OGDEN HI	IGH SCHOOL BASEBALL FIELD RENOVAT	TION - Ogden, Utah
NAME OF PROPOSING	G FIRM:	
PHONE:	DATE:	
Gentlemen:		
related documents, ar conditions surroundin of labor, hereby propo Project in accordance forth and at the price	ompliance with this RFP, has examined the ond the site of the proposed work and being the construction of the proposed projectors to furnish all labor, materials and supper with the Contract Documents as specified stated below. This price is to cover all exprequired under the Contract Documents of	g familiar with all the ct, including the availability blies as required for the d and within the time set penses incurred in
ADDENDA:		
I/We acknowledge re	ceipt of the following addenda:	
///	/	
BID BOND:		
Enclosed is 5%, as req Funds)	uired, in the sum of	(Bond or Certified
BASE BID:		
OGDEN HIGH SCHOO	L BASEBALL FIELD RENOVATION - Ogd	en, Utah
	of the Contract listed above and shown on ect Manual including insurance, I/We agree	_
\$	Dollars \$_	

**ALTERNATES:** See Section 0123000 "Alternates" for complete description of bid alternates. Indicate values below, numerically and written, for each alternate, noting "add" or "deduct" as applicable. In the case of discrepancies, the written amount shall govern.

Construction Cost Form

Alternate No. 1: Announcer's Booth Building.
\$
Dollars \$
Alternate No. 2: Synthetic Grass Surfacing in lieu of Turfgrass Sod and Infield Soils at infield.
Add: \$
Dollars \$
Alternate No. 3: Chain Link Fence at backstop in lieu of Tension Ball Safety Netting.  \$
Dollars \$
COMPLETION DATE:
I/We guarantee to achieve Substantial Completion for this Project no later than, should I/We be the successful bidder.
Liquidated damages for this portion of the work are \$1,000.00 per calendar day.
Liquidated damages for shop drawings/submittals is \$100.00 per calendar day for each submittal received beyond 90 days after Notice of Award.
This proposal shall remain good for sixty (60) days after RFP due date. Unit prices shall

Respondents are required to submit to the Ogden School District a copy of the State of Utah Contractor's License, including a statement of licensure limits. If respondent has requested an increase of monetary licensure limits, a copy of that request must be attached to the proposal at the time the proposal is submitted to the Ogden School District.

remain in effect for a period of eighteen (18) months commencing with the RFP due date.

#### PERFORMANCE AND PAYMENT BONDS:

Construction Cost Form

Upon receipt of notice of acceptance of this proposal, the undersigned agrees to execute the contract within five (5) days and deliver Performance and Payment Bond in the prescribed form in the amount of 100% of the general construction contract price for faithful performance of the contract and payment of sub-contractors. The certified check, cashier's check or bid bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of Ogden School District in the event that the contract is not negotiated and/or the Performance and Payment bond delivered within the time set forth, as liquidated damages for the delay and additional expense caused thereby.

Cost of Bond included in the ori	ginal Base Bid: \$		
SUBSTITUTIONS:			
The following substitutions of mpages if necessary:	aterials and/or equi	pment are propose	ed. Add additiona
Item Manufacturer and De	scription	Addition	Deduction
		\$	
		\$	
		\$	
		\$ \$	
Respectfully Submitted,			
		SEAL (If a Corp	ooration)
Firm Name		, ,	ŕ
Authorized Signature			
Printed Name and Title			
Date			
NOTARY			
Subscribed and sworn be	efore me this	day of	2016.
Notary Public:			
My Commission Expires:			
Authorized Signature			

OGDEN HIGH SCHOOL BASEBALL FIELD RENOVATION References/Past Performance

REFERENCES LIST Name of Subcontractor	
List the name of the client, location, contact, phone numb Reference projects for work performed for the last five (5)	
Contact Information	Telephone Number
REFERENCES LIST Name of Subcontractor	
List the name of the client, location, contact, phone numb Reference projects for work performed for the last five (5)	
Contact Information	Telephone Number
REFERENCES LIST Name of Subcontractor	
List the name of the client, location, contact, phone numb Reference projects for work performed for the last five (5)	
Contact Information	Telephone Number

(Copy this form as many times as necessary to convey references for all Subcontractors listed in Schedule C.)

# OGDEN SCHOOL DISTRICT EVALUATION SHEET OGDEN HIGH SCHOOL BASEBALL FIELD RENOVATION

COMM	ITTEE MEMBER
CONS	TRUCTION COMPANY
1.	<b>5 Points - Responsiveness</b> – The completeness and conformity of the proposal response to the RFP requirements. This includes but is not limited to: Bid bond, contractor's license, sub-contractor's list, CPM Construction Schedule, bid form complete.
SCOR	<b>Ξ</b> :
2.	<b>20 Points - Organization/Construction Team</b> – The administrative and functional structure including personnel, respondent's ability to perform, and the number of personnel committed to each project and response time after first request. Also includes the description of the proposer's local facilities and capability to comply and meet schedules. A list of subcontractors is part of the criteria. (Schedule B)
SCOR	≣:
3.	<b>20 Points - Experience/Expertise</b> – This includes the technical qualifications and work experience of key personnel assigned to work with the District. This also includes past experience on similar projects. (Schedules C)
SCOR	<b>Ξ</b> :
4.	<b>35 Points - Construction Cost</b> – This includes the costs for the entire project as submitted on the RFP form. (Schedule D)
SCOR	<b>Ξ</b> :
5.	20 Points - references/Past Performance – (Schedule E)
SCOR	Ξ:

# Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

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

**BETWEEN** the Owner:

(Name, address and other information)

and the Contractor: (Name, address and other information)

for the following Project: (Name, location, and detailed description)

sample 1

The Architect: (Name, address and other information)

The Owner and Contractor agree as follows.

#### **ADDITIONS AND DELETIONS:**

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

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

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

#### **TABLE OF ARTICLES**

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS
- 10 INSURANCE AND BONDS

#### ARTICLE 1 THE CONTRACT DOCUMENTS

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

#### ARTICLE 2 THE WORK OF THIS CONTRACT

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

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

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner. (Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

- § 3.2 The Contract Time shall be measured from the date of commencement.
- § 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

#### Portion of Work

#### **Substantial Completion Date**

, subject to adjustments of this Contract Time as provided in the Contract Documents. (Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

# **ARTICLE 4 CONTRACT SUM**

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$ ), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

# § 4.3 Unit prices, if any:

(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item Units and Limitations Price Per Unit

§ 4.4 Allowances included in the Contract Sum, if any:

(Identify allowance and state exclusions, if any, from the allowance price.)

ltem Price

# ARTICLE 5 PAYMENTS

# § 5.1 PROGRESS PAYMENTS

- § 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.
- § 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:
- § 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment. (Federal, state or local laws may require payment within a certain period of time.)
- § 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

Init.

by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

- § 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.
- § 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:
  - .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ( ). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201<sup>TM</sup>–2007, General Conditions of the Contract for Construction;
  - Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ( );
  - .3 Subtract the aggregate of previous payments made by the Owner; and
  - Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.
- § 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:
  - Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and (Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
  - .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.
- § 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

# § 5.2 FINAL PAYMENT

- § 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when
  - .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
  - .2 a final Certificate for Payment has been issued by the Architect.
- § 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

# ARTICLE 6 DISPUTE RESOLUTION § 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201-2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. (If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

# § 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201-2007, the method of binding dispute resolution shall be as follows:

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

[	<b>X</b> ]	Arbitration pursuant to Section 15.4 of AIA Document A201–2007
[	]	Litigation in a court of competent jurisdiction
[	]	Other (Specify)

#### ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

#### ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

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

(Insert rate of interest agreed upon, if any.)

per annum

§ 8.3 The Owner's representative:

(Name, address and other information)

§ 8.4 The Contractor's representative: (Name, address and other information) § 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

**§ 8.6** Other provisions:

#### ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

- § 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.
- § 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.
- § 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.
- § 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date		Pages
§ 9.1.4 The Specifications: (Either list the Specifications Title of Specifications exhibit (Table deleted) § 9.1.5 The Drawings: (Either list the Drawings here Title of Drawings exhibit: (Table deleted) § 9.1.6 The Addenda, if any:				
Number		Date	Pages	

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

- § 9.1.7 Additional documents, if any, forming part of the Contract Documents:
  - AIA Document E201<sup>TM</sup>–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:
  - Other documents, if any, listed below: (List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201-2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

#### ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201-2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond

Limit of liability or bond amount (\$ 0.00)

This Agreement entered into as of the day and yea	ir first written above.
OWNER (Signature)	CONTRACTOR (Signature)
(Printed name and title)	(Printed name and title)

# Additions and Deletions Report for

 $AIA^{\oplus}$  Document  $A101^{\text{TM}} - 2007$ 

DACE 4

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sample 1				
PAGE 3				
§ 5.1.3 Provided that an Application the Owner shall make payment of month. If an Application for Paym shall be made by the Owner not la	the certified amount is received by	nt to the Contractor not l	ater than the day oplication date fixed at	
PAGE 5				
[ X] Arbitration pursual	nt to Section 15.4 o	f AIA Document A201–	2007	
per annum				
PAGE 6				
Title of Specifications exhibit: Section	Title	<del>Date</del>	<del>Pages</del>	
Title of Drawings exhibit: Number		Title	Date	

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I, , hereby certify, to the best of my knowledge, information and belief, that simultaneously with its associated Additions and Deletions Report and this under Order No. 1000335356_1 from AIA Contract Documents software are document I made no changes to the original text of AIA® Document A101TB Between Owner and Contractor where the basis of payment is a Stipulated Strategy, other than those additions and deletions shown in the associated A	certification at 13:34:30 on 09/16/2008 and that in preparing the attached final M – 2007 - Standard Form of Agreement Sum, as published by the AIA in its
(Signed)	-
(Title)	-
(Dated)	-

# General Conditions of the Contract for Construction

#### for the following PROJECT:

Canyon Country Discovery Center Phase 2

#### THE OWNER:

Four Corners School of Education 49 West 600 South P.O. Box 1029 Monticello, UT 84535

#### THE ARCHITECT:

MHTN Architects, Inc 420 East South Temple, Suite 100 Salt Lake City, UT 84111

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- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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

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#### **ARTICLE 1 GENERAL PROVISIONS**

#### § 1.1 BASIC DEFINITIONS

#### § 1.1.1 THE CONTRACT DOCUMENTS

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

# § 1.1.2 THE CONTRACT

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

# § 1.1.3 THE WORK

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

# § 1.1.4 THE PROJECT

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

# § 1.1.5 THE DRAWINGS

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

#### § 1.1.6 THE SPECIFICATIONS

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

# § 1.1.7 INSTRUMENTS OF SERVICE

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

#### § 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

#### § 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

- § 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.
- § 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

# § 1.3 CAPITALIZATION

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

#### § 1.4 INTERPRETATION

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

#### § 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

- § 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.
- § 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

#### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

#### **ARTICLE 2 OWNER**

# § 2.1 GENERAL

- § 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.
- § 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

#### § 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

- § 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
- § 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.
- § 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.
- § 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

# § 2.3 OWNER'S RIGHT TO STOP THE WORK

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

# § 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

# ARTICLE 3 CONTRACTOR § 3.1 GENERAL

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

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

#### § 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

#### § 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

#### § 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

- § 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.
- § 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

#### § 3.5 WARRANTY

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

# **§ 3.6 TAXES**

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

# § 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

- § 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.
- § 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.
- § 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.
- § 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.
- § 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

#### § 3.8 ALLOWANCES

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

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

# § 3.9 SUPERINTENDENT

- § 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.
- § 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.
- § 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

# § 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

- § 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.
- § 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.
- § 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

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#### § 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

#### § 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- § 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
- § 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- § 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- § 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.
- § 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.
- § 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- § 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.
- § 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.
- § 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.
- § 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

#### § 3.13 USE OF SITE

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

# § 3.14 CUTTING AND PATCHING

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

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

# § 3.15 CLEANING UP

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

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

#### § 3.16 ACCESS TO WORK

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

# § 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

#### § 3.18 INDEMNIFICATION

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

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

# ARTICLE 4 ARCHITECT § 4.1 GENERAL

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

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

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

# § 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

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

#### § 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

- § 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.
- § 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.
- § 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- § 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.
- § 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.
- § 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.
- § 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.
- § 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.
- § 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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

# ARTICLE 5 SUBCONTRACTORS § 5.1 DEFINITIONS

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

#### § 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- § 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.
- § 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.
- § 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.
- **§ 5.2.4** The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

#### § 5.3 SUBCONTRACTUAL RELATIONS

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

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

# § 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

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

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

- § 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.
- § 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

# ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS § 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

- § 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.
- § 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.
- § 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.
- § 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

#### § 6.2 MUTUAL RESPONSIBILITY

- § 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- § 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

- § 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.
- § 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.
- **§ 6.2.5** The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

# § 6.3 OWNER'S RIGHT TO CLEAN UP

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

# ARTICLE 7 CHANGES IN THE WORK

#### § 7.1 GENERAL

- § 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.
- § 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.
- § 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

#### § 7.2 CHANGE ORDERS

- § 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:
  - .1 The change in the Work;
  - .2 The amount of the adjustment, if any, in the Contract Sum; and
  - .3 The extent of the adjustment, if any, in the Contract Time.

#### § 7.3 CONSTRUCTION CHANGE DIRECTIVES

- § 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.
- § 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.
- § 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
  - .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
  - .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
  - .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

- .4 As provided in Section 7.3.7.
- § 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.
- § 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
- § 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
- § 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:
  - .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
  - .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed:
  - .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
  - .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
  - .5 Additional costs of supervision and field office personnel directly attributable to the change.
- § 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.
- § 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.
- § 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

#### **ARTICLE 8 TIME**

#### § 8.1 DEFINITIONS

- § 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- § 8.1.2 The date of commencement of the Work is the date established in the Agreement.
- § 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.
- § 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

# § 8.2 PROGRESS AND COMPLETION

- § 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
- § 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.
- § 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

# § 8.3 DELAYS AND EXTENSIONS OF TIME

- § 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.
- § 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.
- § 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

# ARTICLE 9 PAYMENTS AND COMPLETION § 9.1 CONTRACT SUM

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

#### § 9.2 SCHEDULE OF VALUES

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

# § 9.3 APPLICATIONS FOR PAYMENT

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

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- § 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.
- § 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.
- § 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.
- § 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

#### § 9.4 CERTIFICATES FOR PAYMENT

- § 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.
- § 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that 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 correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

# § 9.5 DECISIONS TO WITHHOLD CERTIFICATION

- § 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of
  - .1 defective Work not remedied;
  - .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.
- § 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.
- § 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

# § 9.6 PROGRESS PAYMENTS

- § 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.
- § 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.
- § 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.
- § 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.
- § 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.
- § 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.
- § 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

# § 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

#### § 9.8 SUBSTANTIAL COMPLETION

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

- § 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
- § 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.
- § 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.
- § 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

#### § 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

- § 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.
- § 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

# § 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

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

- 1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

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

# ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY § 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

#### § 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

- § 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- § 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.
- § 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- § 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.
- § 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.
- § 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

# § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

#### § 10.3 HAZARDOUS MATERIALS

- § 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.
- § 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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

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

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

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

## § 10.4 EMERGENCIES

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

# ARTICLE 11 INSURANCE AND BONDS § 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

#### § 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

## § 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Subsubcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

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otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

## § 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

## § 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

## § 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, subsubcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, subsubcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

## § 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

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

## ARTICLE 12 UNCOVERING AND CORRECTION OF WORK § 12.1 UNCOVERING OF WORK

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

## § 12.2 CORRECTION OF WORK § 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

## § 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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- § 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.
- § 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.
- § 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- § 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.
- § 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

## § 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

# ARTICLE 13 MISCELLANEOUS PROVISIONS § 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

## § 13.2 SUCCESSORS AND ASSIGNS

- § 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.
- § 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

## § 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

## § 13.4 RIGHTS AND REMEDIES

- § 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.
- § 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

#### § 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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

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

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

## § 13.6 INTEREST

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

## § 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

# ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT § 14.1 TERMINATION BY THE CONTRACTOR

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

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.
- § 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.
- § 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.
- § 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

## § 14.2 TERMINATION BY THE OWNER FOR CAUSE

- § 14.2.1 The Owner may terminate the Contract if the Contractor
  - 1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
  - fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
  - .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
  - .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.
- § 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
  - .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
  - .2 Accept assignment of subcontracts pursuant to Section 5.4; and
  - Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.
- § 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.
- § 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

## § 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

- § 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent
  - .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
  - .2 that an equitable adjustment is made or denied under another provision of the Contract.

## § 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

- § 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.
- § 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall
  - .1 cease operations as directed by the Owner in the notice;
  - .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;
  - **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.
- § 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

## **ARTICLE 15 CLAIMS AND DISPUTES**

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

## § 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

## § 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

## § 15.1.4 CLAIMS FOR ADDITIONAL COST

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

## § 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

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## § 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

## § 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

## § 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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

## § 15.4 ARBITRATION

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

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

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

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

## § 15.4.4 CONSOLIDATION OR JOINDER

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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



## Additions and Deletions Report for

 $AIA^{\text{@}}$  Document  $A201^{\text{TM}} - 2007$ 

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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## Certification of Document's Authenticity

AIA® Document D401™ - 2003

I created the attached final document certification at 09:35:25 on 03/31/2009 d that in preparing the attached final 1 – 2007 - General Conditions of the n those additions and deletions shown in

## SUPPLEMENTARY CONDITIONS

The following supplements modify AIA Document A201–2007, General Conditions of the Contract for Construction. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

## **ARTICLE 1 GENERAL PROVISIONS**

## § 1.1.1 THE CONTRACT DOCUMENTS

Delete Section 1.1.1 and substitute the following:

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

## § 1.1.2 THE CONTRACT

Amend the fourth sentence of Section 1.1.2 as follows:

The Contract Documents shall not be construed to create a contractual, agency or other relationship of any kind....

Add the following paragraph to the end of Section 1.1.2:

Nothing herein shall be construed to create any agency, third party beneficiary or other representative relationship. All contracts related to construction create an independent contractor relation. There are no intended third-party beneficiaries to the contract.

#### § 1.1.8 INITIAL DECISION MAKER

Delete Section 1.1.8 and substitute the following:

§ 1.1.8 The Architect shall be identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2

## § 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add Section 1.2.1.1 through 1.2.1.5 to Section 1.2.1:

§ 1.2.1.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based upon the following priorities:

- .1 Modifications
- .2 The Agreement
- .3 Addenda with those of later date having precedence over those of earlier date.

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- .4 The Supplementary Conditions
- .5 The General Conditions
- **.6** Division 1 of the Specifications
- .7 Drawings and Divisions 2-33 of the Specifications
- .8 Other documents specifically enumerated in the Agreement as part of the Contract Documents.

In the case of conflicts or discrepancies between Drawings and Divisions 2-49 of the specifications, or within or among the Contract Documents and not clarified by Addendum, the Architect will determine which takes precedence in accordance with Section 4.2.11, 4.2.12, and 4.2.13.

- § 1.2.1.2 In general, the Drawings indicate dimensions, positions and details of construction; the Specifications describe qualities of materials and methods of workmanship. All Work described in the Specifications or shown on the Drawings and all Work dependent upon or necessary to complete finish of the Work so described or shown shall be executed in a workmanlike manner and shall be of the materials best adapted to the purpose where such Work or materials are not specifically mentioned.
- § 1.2.1.3 Large scale Drawings shall have precedence over small scale Drawings in the same area or conditions and should any discrepancy occur between such large and small Drawings the same shall be referred to the Architect for decision or clarification. Minor modifications of detailed Drawings may be made in larger or full-size Drawings to clarify detail and to provide proper connection or construction at points not specifically detailed. Where a portion of the Drawings or details is shown in outline, the portion shown in outline shall be constructed the same as like portions of the Work. If during the course of the Contract, conflicts are found between the various parts of the Drawings or between Drawings and Specifications, the Architect will interpret the Drawings and/or Specifications so as to secure the most substantial and complete performance of the Work.
- § 1.2.1.4 Certain materials and equipment are specified by manufacturer or trade name to establish standards of quality and performance and not for the purpose of limiting competition. Products of other manufacturers may be substituted, if, in the opinion of the Owner and the Architect, they are equal to those specified in quality, performance, design and suitability for intended use. Where two or more items are mentioned, the selection among those specified is the Contractor's option. Bids based on material and equipment other than those specified shall include a statement of substitutions stating difference in cost, if any, for each proposed substitution. Substitutions accepted prior to award of the Contract will be covered by modification to the original Contract Documents. Prior to consideration of any substitution, the Architect may require submission of samples, descriptive, technical and catalog data and reports of tests.
- § 1.2.1.5 All Work and material shall be the best of the respective kinds specified or indicated. Should any workmanship or materials not be directly or indirectly called for in the Specifications and/or shown on the Drawings, but same are necessarily implied from the obvious intent thereof, or required by any applicable code, said workmanship or materials shall be provided as part of the contract and be of a quality the same as similar parts indicated or specified.

Add the following Sections 1.2.4, 1.2.5 and 1.2.6 to Section 1.2:

- § 1.2.4 In the event of conflict between any form Contract Document and any Addenda thereto, the Addenda shall control interpretation.
- § 1.2.5 The Drawings and Specifications are complementary and what is required by one shall be as binding as if required by all. Bidders are required to bid everything noted on both Drawings and Specifications. Should a discrepancy arise between the Drawings and the Specifications, the Contractor will provide a price for the more restrictive of the discrepancies as a rule.

§ 1.2.6 Notes and call-outs are to be representative of the complete scope of the project documents. Callouts made in one location apply to all similar conditions.

## § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

Add the following Section 1.6.1 to Section 1.6:

§ 1.6.1 Release of Electronic Media Drawings and Files: an agreement entitled "License and Indemnification Agreement" must be signed and returned to the Architect prior to release of any Documents. A copy of the release is included in Division 1 Sections and may be obtained from the Architect.

#### **ARTICLE 2 - OWNER**

## § 2.1 GENERAL

Amend Section 2.1.2 as follows:

Delete these words from the first sentence: "give notice of or enforce mechanic's lien rights."

Add at the end: "Because no entity may file liens against the Owner as a governmental entity, nothing herein shall be construed to grant a right to assert mechanic's liens against property of the Owner."

## § 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete Section 2.2.1.

Delete Section 2.2.5 and substitute the following:

The Owner shall furnish to the Contractor a digital copy of the Contract Documents for purposes of making reproductions

Delete the second to last sentence in Section 2.4.

## **ARTICLE 3 - CONTRACTOR**

## § 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following to the end of Section 3.2.2:

However, nothing herein shall be construed to relieve Contractor of the duty to perform the work in accordance with applicable laws, statutes, ordinances, building codes, rules and regulations."

Add at end of Section 3.2.3, delete the period and add the following:

, or unless the Contract Documents require Work that does not conform to prevailing industry standards.

Add the following Section 3.2.5 to Section 3.2:

§ 3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

## § 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Delete Section 3.3.3 and substitute the following:

The Contractor shall be responsible for inspection of the Work already performed to determine that such portions of Work are in proper condition to receive subsequent Work and to ensure that it complies with the Contract Documents and relevant codes and authorities having jurisdiction so that portions are in proper condition to receive subsequent Work.

## § 3.4 LABOR AND MATERIALS

Add the following Section 3.4.4 to Section 3.4:

- § 3.4.4 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the contractor:
  - .1 represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all aspects to that specified
  - .2 represents that it will provide the same warranty for the substitution as it would have provided for the product specified.
  - .3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently becomes apparent; and
  - .4 shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all aspects.

The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed-upon changes in the Drawings and Specifications resulting from such substitutions.

The Contractor shall cooperate with the Architect in forwarding the interests of the Owner; he/she shall furnish efficient and skilled business administration and supervision during crucial periods along with an adequate supply of workmen and materials and complete the work in a thoroughly workmanlike and most expeditious manner to the satisfaction of the Architect and Owner.

Add the following Section 3.4.5 to Section 3.4:

§ 3.4.5 The Contractor shall be responsible for storing, maintaining and preserving in a safe and professional manner the materials that are delivered to the site prior to time for installation.

## § 3.5 WARRANTY

Add the following Section 3.5.1 to Section 3.5:

§ 3.5.1 The Contractor shall pass through to the Owner in writing or assign, all manufacturer or supplier warranties.

#### **§ 3.6 TAXES**

Delete Section 3.6.1 and substitute the following:

§ 3.6.1 Purchases of construction materials by the Contractor are not subject to Utah State Sales Tax. Tax Exempt Form TC-721g must be used by vendors when purchasing construction materials. The Owner will provide a Form TC-721g, signed by the Owner's Chief Procurement Officer, or designee, authorizing the exemption of sales tax on material purchases for the Contractor's use on the project.

## § 3.7 PERMITS, FEES AND NOTICES Delete 3.7.1 and revise to read as follows

Delete Section 3.7.1 and substitute the following:

§ 3.7.1 Unless otherwise notified in writing, the Contractor shall not be required to obtain building permits or other permits from governmental authorities. The Owner shall provide its own inspectors to comply with inspection requirements of governmental authorities. However, the fact that the Owner provides its own inspectors for such purposes does not release the Contractor from the obligation to conduct inspections of the Work to ensure that it complies with Contract Documents, or to otherwise comply with all applicable laws, statutes, ordinances, building codes, rules and regulations.

Add the following Sections 3.7.1.1 and 3.7.1.2 to Section 3.7.1:

- § 3.7.1.1 Fees for impact fees and permits for off-site work and roadways are the responsibility of the Contractor. On-site permits are the responsibility of the Owner.
- § 3.7.1.2 Where inspections required by the Contract Documents, and indicated to be provided by the Owner, require re-inspection, the Contractor shall reimburse the Owner the amount of \$200.00 for each additional inspection required after the first re-inspection to determine compliance with requirements. Reimbursement shall apply until compliance with requirements is noted as approved by the Architect and / or consultants for each Work item requiring re-inspection.

## § 3.9 SUPERINTENDENT

Add the following Section 3.9.3 to Section 3.9:

§ 3.9.4 The Superintendent as well as the Project Coordinator is subject to the Approval of the Owner. Should the Owner request removal of the Superintendent and/or the Project Coordinator during the course of the Work, a replacement superintendent and/or Project Coordinator, acceptable to the Owner, shall be provided to permit the Project to proceed without delay.

## § 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Add the following to Section 3.12.5:

Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect to the Contractor without action.

The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

## § 3.18 INDEMNIFICATION

Add the following paragraph to the end of Section 3.18.1

The Contractor's duty to indemnify and hold harmless shall extend to contract claims against the Owner by any Subcontractor or third party arising from errors, negligence or omissions of the Contractor or Contractor's alleged failure to pay amounts due and owing.

## **ARTICLE 4 – ARCHITECT**

## § 4.2 ADMINISTRATION OF THE CONTRACT

Add the following Section 4.2.2.1 to Section 4.2.2:

§ 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects or deficiencies in the Work.

#### § 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Add the following Section 4.2.7.1 to Section 4.2.7:

§ 4.2.7.1 In no case will the Architect's review period on any submittal be less than 10 days after receipt of the submittal from the Contractor.

Add the following Section 4.2.14.1 to Section 4.2.14:

§ 4.2.14.1 Contractor's requests for information shall be prepared and submitted in accordance with Division 1 "General Requirements" sections on the form included in the Contract Documents, on AIA Document G716-2004, or Contractor's form of similar format, if acceptable to Architect. The Architect will return without action requests for information that do not conform to requirements of the Contract Documents.

## **ARTICLE 5 - SUBCONTRACTORS**

## § 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Revise the first two lines of Section 5.2.1 to read:

The Contractor, no later than two days after award of the Contract, shall furnish in writing to the Owner through the Architect the names of....

Add the following Section 5.2.5 to Section 5.2:

§ 5.2.5 As part of the Proposal, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities proposed as manufacturers or fabricators for certain products, equipment and systems identified in Division 1 "General Requirements" sections, and where applicable, the name of the installing Subcontractor. The Architect may reply within 5 days to the Contractor in writing stating (1) whether the Owner or Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time to review. Failure of the Owner or Architect to reply within a 14-day period shall constitute notice of no reasonable objection.

## § 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete Section 5.4 in its entirety.

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

## § 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

Delete all references to waiver of subrogation in Section 6.1.1.

## § 6.2 MUTUAL RESPONSIBILITY

Delete the second sentence of Section 6.2.3.

## **ARTICLE 7 - CHANGES IN THE WORK**

## § 7.1 GENERAL

Add the following Section 7.1.4 to Section 7.1:

§ 7.1.4 The allowance for the combined overhead and profit and related bond costs, included in the total cost to the Owner shall be limited to the following schedule:

- .1 Markup for the Contractor, and Subcontractors combined, shall not exceed 15 percent of the cost.
- .2 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also.
- .3 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7.

## § 7.3 CONSTRUCTION CHANGE DIRECTIVES

Delete Section 7.3.7.5 and substitute the following:

.5 Additional costs of supervision and field office personnel, and processing of documentation of the change is considered to be part of General Conditions and is not attributable to the change for general construction work or Work performed under allowance amounts.

## **ARTICLE 8 -TIME**

Add the following sentence to Section 8.1.4:

The term "working day" as used in the Contract Documents shall mean any calendar day except Saturday, Sunday and legal holidays at the Project Site.

#### **ARTICLE 9 - PAYMENTS AND COMPLETION**

## § 9.3 APPLICATIONS FOR PAYMENT:

Add the following sentence to Section 9.3.1:

The form for Application for Payment, duly notarized, shall be a current authorized edition of the AIA Document G702-1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document

Add the following Section 9.3.1.3 to Section 9.3.1:

§ 9.3.1.3 Payments made shall be 95 percent of scheduled values requested by each Application for Payment. Retainage shall be 5 percent of the scheduled value of each Work item and shall be withheld until issuance of the Certificate of Substantial Completion as indicated within Section 9.8.5. Retainage shall be held in an interest bearing account and distributed upon disbursement on a pro rata basis among all sub-contractors

Add the following Section 9.3.2.1 to Section 9.3.2:

§ 9.3.2.1 Progress payments for stored materials in a bonded warehouse will be paid in accordance with paragraph 9.3.1.3.

## § 9.4 CERTIFICATES FOR PAYMENT

Revise the fourth sentence of Section 9.4.2 to read:

"The issuance of a Certificate for Payment is a representation by the Architect that although the Architect has made reasonable inspections to determine that the Work complies with the Contract Documents, nevertheless, the Architect does not represent that the Architect has: (1) ...."

## § 9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following Section 9.5.1.8 to Section 9.5.1:

Nothing in this Agreement shall be construed to create a third party beneficiary contract, agency or any other relationship between Owner and any Subcontractor or Subsubcontractor.

## § 9.6 PROGRESS PAYMENTS

Add the following Section 9.6.1.1 to Section 9.6.1:

§ 9.6.1.1 The Owner shall retain five percent (5%) of each progress payment until issuance of the Certificate of Substantial Completion as indicated within Section 9.8.5. The aggregate amount of retainage, together with interest at the variable rate determined by the State Fiduciary account, shall be paid to the Contractor as applicable.

## § 9.7 FAILURE OF PAYMENT

Revise Section 9.7 to read fifteen (15) wherever it refers to seven.

## § 9.8 SUBSTANTIAL COMPLETION

Delete Section 9.8.1 and substitute the following:

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The following items that are within the scope of Work, completed in their entirety, including, but not limited to the following, shall qualify the Work to be substantially complete:

- .1 Completion of all scheduled finishes: flooring, ceilings, interior architectural woodwork, (finish wall, ceiling and floor coatings), acoustical treatments, visual display boards, partitions & accessories.
- .2 Completion of all doors and door hardware, functioning as scheduled.
- .3 Completion of all roof systems.
- .4 Completion of all window systems.
- .5 Completion of all door access controls and door control devices.
- .6 Completion of mechanical systems, including operational mechanical controls and issuance of the testing and balancing report.
- .7 Completion of all plumbing systems, including fixtures being connected and functioning.

- **.8** Completion of the automatic sprinkler system.
- **.9** Completion of all electrical systems, including power distribution, light fixtures and day lighting controls.
- .10 Completion of all audio / video, data and phone systems.
- .11 Completion of all fire and smoke alarm systems.

Add the following Section 9.8.3.1 to Section 9.8.3:

§ 9.8.3.1 The Architect will perform no more than TWO (2) observations to determine whether the work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for additional inspections.

Add the following Section 9.8.6 to Section 9.8:

§ 9.8.6 The certificate issued by the Contractor shall warrant to the Owner that the Work has been performed according to and complies with Drawings and Specifications, that all Work has been performed in a good and workmanlike manner and that there are no undisclosed latent dangers in the construction.

## § 9.9 PARTIAL OCCUPANCY OR USE

Delete Section 9.9.1 and substitute the following:

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by the Owner and approved as to safety by the Owner's quality control inspectors and authorities having jurisdiction. Such partial occupancy or use may commence whether or not the portion is Substantially Complete. In the event of such partial use or occupancy, the Owner and Contractor shall specify in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and the Owner has designated in writing the period for correction of the Work and commencement of warranties required by the Contract Documents, so long as the original schedule is not shortened.

§ 9.9.1.1 When the Contractor considers a portion of the Work Substantially Complete, the Contractor shall prepare and submit a list to the Architect as provided in Section 9.8.2. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

## § 9.10 FINAL COMPLETION AND FINAL PAYMENT

Add the following Section 9.10.1.1 to Section 9.10.1:

§ 9.10.1.1 The Architect will perform no more than TWO (2) observations to determine whether the work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for additional inspections.

Add the following Section 9.10.2.1 to Section 9.10.2:

§ 9.10.2.1 The Certificate of Final Completion provided by the Contractor to the Owner constitutes a warranty to the Owner that the Work has been performed according to and complies with the Contract Documents, that all Work is performed in a good and workmanlike manner and that there are no undisclosed latent dangers in the construction.

Add the following Sections 9.10.4.4, 9.10.4.5 and 9.10.4.6 to Section 9.10.4:

- .4 any Owner liability arising from defects or dangers known to Architect or Contractor that were not disclosed in writing to Owner.
- **.5** Any liquidated damages resulting from failure to timely complete the Work.
- **.6** Any claims for fraud or fraudulent concealment.

Add the following Section 9.11 to Article 9:

## **§ 9.11 DAMAGES**

The Contractor and the Contractor's surety shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages, and not as a penalty, for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the work is Substantially Complete, including all punch list items: One Thousand dollars (\$1,000.00) per day.

## ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

## § 10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Section 10.2.1.4 to Section 10.2.1:

Add as paragraph 10.2.1.4: "Third parties who are invited onto the site or who may otherwise reasonably be expected to access the site."

Add the following Section 10.2.2.1 to Section 10.2.2:

§ 10.2.2.1 Nothing herein shall be construed to subject the Owner to the jurisdiction of local or state authorities except to the extent required by law.

Add the following Section 10.2.6.1 to Section 10.2.6:

§ 10.2.6.1 The Contractor shall institute a safety program at the start of construction to minimize accidents, until Final Completion of the Project and conform to the latest requirements of the State Occupational and Safety Health Act.

Add the following Sections 10.2.7.1 through 10.2.7.4 to Section 10.2.7:

- § 10.2.7.1 The Contractor shall keep areas affected by the work or adjacent to the site free from snow, ice, rubbish, excavation, encumbrances or any obstacles resulting from the construction operations, and in safe condition to the satisfaction of the authorities having jurisdiction.
- § 10.2.7.2 The Contractor shall at all times provide protection against weather, rain, winds, storms, frost or heat, so as to maintain all work, materials, apparatus and fixtures, free from injury or damage. At the end of the day's work, all new work likely to be damaged shall be covered.
- § 10.2.7.3 Adequate precautions shall be taken against fire throughout all the Contractor's operations. The amount of inflammable material shall be reduced to a minimum consistent with the proper handling and storing of materials. Except as otherwise provided herein, the Contractor shall not permit fires to be built or open salamander heaters to be used in any part of the work.
- § 10.2.7.4 The Contractor shall provide at the site, and make available to all workmen, medical supplies and equipment necessary to supply first aid service to all persons who may be injured in connection with the Work.

## § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

Add the following paragraph to Section 10.2.8:

The Contractor shall provide the Architect with a copy of all reports of accidents and claims arising out of or in connection with the performance of the Work. He / she shall immediately notify the Architect of accidental death, major injury to persons, and extensive damage to the Work. If any claim is made by anyone against the Contractor or any Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Architect, giving full details of the claim.

## § 10.3 HAZARDOUS MATERIALS

Add the following to the end of Section 10.3.2:

"...provided that the presence of hazardous materials was not foreseeable to the Contractor at the time of entering into this Agreement."

Delete Section 10.3.3.

#### **ARTICLE 11 - INSURANCE AND BONDS**

## § 11.1 CONTRACTOR'S LIABILITY INSURANCE

Delete semicolon at end of Section 11.1.1.1 and add:

, including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project.

Delete the semicolon at end of Section 11.1.1.2 and add:

or persons or entities excluded by statute from the requirements of Section 11.1.1.1 but required by the Contract Documents to provide the insurance required by that section.

Add the following Sections 11.1.2.1 through 11.1.2.4 to Section 11.1.2:

- § 11.1.2.1 The limits for Workers Compensation and Employers Liability Insurance shall meet statutory limits mandated by State and Federal Laws. If (1) limits in excess of those required by statute are to be provided, (2) the employer is not statutorily bound to obtain such insurance coverage, or (3) additional coverages are required, additional coverages and limits for such insurance shall be as follows:
- § 11.1.2.2 The limits for Commercial General Liability insurance including coverage for Premisesoperations, independent Contractors' Protective, Products-Completed Operations, Contractual Liability, Personal Injury and Broad Form Property Damage (including coverage for Explosion, Collapse and underground Hazards) shall be as follows:
  - \$1,000,000 Each Occurrence
  - \$2,000,000 General Aggregate
  - \$ 1,000,000 Personal and Advertising Injury
  - \$ 1,000,000 Products Completed operations Aggregate
  - .1 The policy shall be endorsed to have the General Aggregate apply to this Project only.
  - .2 The contractual Liability Insurance shall include coverage sufficient to meet the

obligations in AIA Document A201-2007 under Section 3.18.

.3 Products and Completed Operations insurance shall be maintained for a minimum period of at least ONE (1) year after the expiration of the period for correction of the Work.

§ 11.1.2.3 Automobile Liability insurance (owned, non-owned and hired vehicles) for bodily injury and property damage \$ 1,000,000 Each Accident.

§ 11.1.2.4 Umbrella or Excess Liability Coverage: \$5,000,000.

Reference is made to Paragraph 3.18, Indemnification, of AIA Document A201.

Add the following paragraphs to Section 11.1.3:

If this insurance is written on a Comprehensive General Liability policy form, the certificate shall be ACORD form 25-S completed and supplemented in accordance with AIA Document G715-1991, Instruction Sheet and Supplemental Attachment for ACORD Certificate of Insurance 25-S.

Specifically set forth evidence of all coverage required by Subparagraphs 11.1.1 and 11.1.2. Furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

Add the following Section 11.1.3.1 to Section 11.1.3:

§ 11.1.3.1 Coverage on a claims-made basis will not be acceptable.

#### § 11.2 OWNERS LIABILITY INSURANCE

Delete Section 11.2 and substitute the following:

The Owner shall provide insurance available to it from Utah State Risk Management to cover the Project Site.

## § 11.3 PROPERTY INSURANCE

Delete Section 11.3.1 and substitute the following:

§ 11.3.1 The Owner shall provide insurance on the site as provided through State Risk Management." add the following: The deductible shall be \$5,000.00 per claim; Contractor shall pay the deductible.

Unless otherwise provided in the Contract Documents, the property insurance provided by the Owner will cover materials and portions of the work stored on the project site, but not yet installed in the building or structure. The Contractor shall be responsible to provide property insurance for all risks of physical loss including theft or portions of the work stored off the project site or in transit, regardless of Owners title as outlined in Paragraph 9.3.2. In the event Contractor fails to maintain the required insurance for materials stored off-site and in transit, he / she shall bear financial responsibility for the full replacement cost of any loss.

Delete Section 11.3.1.1 and substitute the following:

§ 11.3.1.1 The insurance required by Section 11.3 is not intended to cover machinery, tools or equipment owned or rented by the Contractor that are utilized in the performance of the Work but not incorporated into the permanent improvements. The Contractor shall, at the Contractor's own expense, provide insurance coverage for owned or rented machinery, tools or equipment, which shall be subject to the provisions of Section 11.3.7

Delete Sections 11.3.1.2, 11.3.1.5, 11.3.2, 11.3.3, 11.3.4, 11.3.5 and 11.3.6.

Delete Section 11.3.9.

Delete Section 11.3.10.

#### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

Delete Sections 11.4.1 and 11.4.2 and substitute the following:

§ 11.4.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum

§ 11.4.2 The contractor shall deliver the required bonds to the Owner not later than three days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to the Letter of Intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ 11.4.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

#### ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

## § 12.2 CORRECTION OF WORK

Add the following paragraph to Section 12.2.2.1:

Nothing herein shall be construed to waive claims Owner has against Contractor for failure to build according to plan or in accordance with authorities having jurisdiction. All work performed during the one-year period shall be performed at the Contractor's expense.

Add the following paragraph to Section 12.2.2

§ 12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct, and the Contractor shall attend a meeting with the Owner to review the facility operations and performance.

#### **ARTICLE 13 – MISCELLANEOUS PROVISIONS**

## § 13.2 SUCCESSORS AND ASSIGNS

Delete the second sentence in Section 13.2.2.

Add Section 13.8 to Article 13:

## § 13.8 EQUAL OPPORTUNITY

§ 13.8.1 The Contractor shall maintain policies of employment as follows:

§ 13.8.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but are not limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

§ 13.8.1.2 The Contractor and Contractor's Subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

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

## § 14.1 TERMINATION BY THE CONTRACTOR

Delete the following from Section 14.1.3:

...reasonable overhead, profits and damages.

#### § 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

Delete Section 14.3.1 and substitute the following:

§ 14.3.1 The Owner may terminate for convenience as long as the Contractor is paid in full for all Work performed and costs incurred through the date of termination.

Add Section 14.5 to Article 14:

§ 14.5 Nothing herein shall be construed to subject the Owner to the jurisdiction of local or state authorities except to the extend required by law.

## **ARTICLE 15 CLAIMS AND DISPUTES**

## § 15.1.4 CLAIMS FOR ADDITIONAL COST

Add the following to Section 15.1.4.1:

However, an addition to the Contract Sum shall be permitted only in the event of a material addition not contemplated in the Contract Documents.

## § 15.1.5 CLAIMS FOR ADDITIONAL TIME

Add the following Sections 15.1.5.3 and 15.1.5.4 to Section 15.1.5:

§ 15.1.5.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

§ 15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of

## **Ogden High School Baseball Field Renovation**Ogden School District

MHTN Project No. 2022539 Construction Documents - 18 August 2022

the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

## § 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

Add the following paragraph to Section 15.1.6:

If, before expiration of 30 days from the date of execution for this Agreement, the Owner obtains by separate agreement and furnishes to the Contractor a similar waiver of all claims from the Architect against the Contractor for consequential damages which the Architect may incur as a result of any act or omission of the Contractor, then the waiver of consequential damages contained in this Section 15.1.6 shall be applicable to claims by the Contractor against the Architect.

Delete Section 15.1.6.1.

Delete the following from Section 15.1.6.2:

...except anticipated profit arising directly from the Work.

## § 15.2 INITIAL DECISION

Modify the last sentence in Section 15.2.5, after the words "but subject to ..." to read:

...but subject to the rights of the parties to assert their claims in a court of law or by mediation.

#### § 15.3 MEDIATION

Amend to state "may" wherever the word "shall" appears in this article.

## § 15.4 ARBITRATION

Delete Section § 15.4 and all of its subparts in their entirety.

Add the following article:

#### **ARTICLE 16 ADDITIONAL RESPONSIBILITIES**

§ 16.1 Temporary Signs shall not be permitted without review of the Architect.

**END OF SUPPLEMENTARY CONDITIONS** 

## Performance Bond

CONTRACTOR (Name and Address):	<b>SURETY</b> (Name and Principal Place of Business):
<b>OWNER</b> (Name and Address):	
CONSTRUCTION CONTRACT Date: Amount: Description (Name and Location):  BOND Date (Not earlier than Construction Contamount: Modifications to this Bond:	ntract Date):  None See Last Page
CONTRACTOR AS PRINCIPAL Company: (Corporate Seal)  Signature: Name and Title: (Any additional signatures appear on the	SURETY Company: (Corporate Seal)  Signature: Name and Title:
(FOR INFORMATION ONLY - Name, A AGENT or BROKER:	

#### **ADDITIONS AND DELETIONS:**

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

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

Any singular reference to Contract, Surety, Owner or other party shall be considered plural where applicable.

- § 1 The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
- § 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Section 3.1.
- § 3 If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
- § 3.1 The Owner has notified the Contractor and the Surety at its address described in Section 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
- § 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Section 3.1; and
- § 3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.
- § 4 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
- § 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or
- § 4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or
- § 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or
- § 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
  - .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefor to the Owner; or
  - .2 Deny liability in whole or in part and notify the Owner citing reasons therefor.
- § 5 If the Surety does not proceed as provided in Section 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
- § 6 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Section 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

- **§ 6.1** The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- § 6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 4; and
- **§ 6.3** Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
- § 7 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators or successors.
- § 8 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
- § 9 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- § 10 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
- § 11 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

## § 12 DEFINITIONS

- § 12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
- § 12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
- § 12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
- § 12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

## § 13 MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

CONTRACTOR AS	PRINCIPAL (Company)	SURETY	(C
Company:	(Corporate Seal)	Company:	(Corporate Seal)
		<del></del>	
Signature: Name and Title:		Signature: Name and Title:	•
Address:		Address:	

Payment Bond	
CONTRACTOR (Name and Address):	<b>SURETY</b> (Name and Principal Place of Business):
OWNER (Name and Address):	
CONSTRUCTION CONTRACT	
Date:	
Amount:	
Description (Name and Location):	
BOND	
Date (Not earlier than Construction Contract Date Amount:	tte):
Modifications to this Bond: X None	See Last Page
CONTRACTOR AS PRINCIPAL	SURETY
Company: (Corporate Seal)	Company: (Corporate Seal)
Signature:	Signature:
Name and Title:	Name and Title:
(Any additional signatures appear on the last page)	ge)

(FOR INFORMATION ONLY - Name, Address and Telephone)

**AGENT** or **BROKER**:

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User Notes: (3104265042)

OWNER'S REPRESENTATIVE (Architect,

Engineer or other party):

- § 1 The Contractor and the Surety, jointly and severally bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
- § 2 With respect to the Owner, this obligation shall be null and void if the Contractor:
- § 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
- § 2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Section 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.
- § 3 With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
- § 4 The Surety shall have no obligation to Claimants under this Bond until:
- § 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Section 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
- § 4.2 Claimants who do not have a direct contract with the Contractor:
  - .1 Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
  - Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
  - .3 Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Section 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
- § 5 If a notice required by Section 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
- § 6 When the Claimant has satisfied the conditions of Section 4, the Surety shall promptly and at the Surety's expense take the following actions:
- § 6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
- § 6.2 Pay or arrange for payment of any undisputed amounts.
- § 7 The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
- § 8 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
- § 9 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

- § 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
- § 11 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Section 4.1 or Section 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- § 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
- § 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
- § 14 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

## § 15 DEFINITIONS

- § 15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.
- § 15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
- § 15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

## § 16 MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

(Space is provided CONTRACTOR AS		of added parties, other than <b>SURETY</b>	those appearing on the cover page.
Company:	(Corporate Seal)	Company:	(Corporate Seal)
Signature: Name and Title: Address:		Signature: Name and Title: Address:	

## Additions and Deletions Report for

AIA<sup>®</sup> Document A312<sup>™</sup> – 1984

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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PAGE 1
Modifications to this Bond: X None See Last Page
PAGE 5
Modifications to this Bond: $\underline{\underline{X}}$ None See Last Page
PAGE 7

# Certification of Document's Authenticity

AIA® Document D401™ - 2003

si ur de pr	, hereby certify, to the best of my knowledge, information and belief, that multaneously with its associated Additions and Deletions Report and this order Order No. 1000212544_1 from AIA Contract Documents software an ocument I made no changes to the original text of AIA® Document A312TM ablished by the AIA in its software, other than those additions and deletion eletions Report.	tertification at 15:49:02 on 09/21/2006 d that in preparing the attached final 1 – 1984 - Performance Bond, as
(5	iigned)	
(7	Title)	
(1)	Dated)	

# **Change Order**

cample 1	CHANGE ORDER NUMBER: 001		OWNER: _			
sample 1	DATE:	А	ARCHITECT: ☐  CONTRACTOR: ☐			
TO CONTRACTOR (Name and address):	ARCHITECT'S PROJECT NUMBER:	CON				
	CONTRACT DATE:		FIELD:			
	CONTRACT FOR: General Construction	1	OTHER:			
THE CONTRACT IS CHANGED AS FOLL						
(Include, where applicable, any undispute	ed amount attributable to previously exect	uted Construction Change Directives	·)			
The original Contract Sum was		\$	0.00			
The net change by previously authorized ( The Contract Sum prior to this Change On		\$	0.00			
The Contract Sum will be increased by th		<b>š</b> –	0.00			
	ontract Sum including this Change Order will be					
The Contract Time will be increased by Z The date of Substantial Completion as of						
<b>NOTE:</b> This Change Order does not include been authorized by Construction Change						
		ii agreed upon by both the Owner an	d			
Contractor, in which case a Change Order	r is executed to supersede the Construction	n Change Directive.	a			
NOT VALID UNTIL SIGNED BY THE	r is executed to supersede the Construction	-	d			
NOT VALID UNTIL SIGNED BY THE	ARCHITECT, CONTRACTOR AND O	WNER.	d			
NOT VALID UNTIL SIGNED BY THE	r is executed to supersede the Construction	-	d			
	ARCHITECT, CONTRACTOR AND O	WNER.	d			
NOT VALID UNTIL SIGNED BY THE  ARCHITECT (Firm name)	ARCHITECT, CONTRACTOR AND O	WNER.  OWNER (Firm name)	d			
NOT VALID UNTIL SIGNED BY THE  ARCHITECT (Firm name)  ADDRESS	ARCHITECT, CONTRACTOR AND O  CONTRACTOR (Firm name)  ADDRESS	WNER.  OWNER (Firm name)  ADDRESS	d			

# Application and Certificate for Payment

TO OWNER:	PROJE	CT:	sample 1		APPLICATION NO: 001 Distribut	
					i Linds io.	IER: 🗌
					CONTRACT FOR: General Construction ARCHITE	CT:
FROM CONTRACTOR:	VIA ARCHIT	ECT.			CONTRACT DATE: CONTRACTO	OR:
CONTRACTOR.	ARCIII	EUI.			PROJECT NOS: / /	ELD:
					ОТН	IER: 🗌
CONTRACTOR'S APPLICATION F	OR PAYMEN	IT.			The undersigned Contractor certifies that to the best of the Contractor's knowledge, infor	
Application is made for payment, as shown below, Continuation Sheet, AIA Document G703, is attach	in connection with ned.	the Co	ntract.		and belief the Work covered by this Application for Payment has been completed in accowith the Contract Documents, that all amounts have been paid by the Contractor for Wowhich previous Certificates for Payment were issued and payments received from the Own	ork for
1. ORIGINAL CONTRACT SUM			\$	0.00	that current payment shown herein is now due.	
2. Net change by Change Orders			\$	0.00	CONTRACTOR:	
3. CONTRACT SUM TO DATE (Line $1 \pm 2$ )			\$	0.00	By: Date:	
4. TOTAL COMPLETED & STORED TO DATE (Colum	n G on G703)		\$	0.00		
5. RETAINAGE:					County of:	
<b>a.</b> 0 % of Completed Work					Subscribed and sworn to before	
(Column D + E on $G703$ )	\$		0.00		me this day of	
<b>b.</b> 0 % of Stored Material	¢		0.00		Madama Dark Ear.	
(Column F on G703)	\$		0.00	0.00	Notary Public: My Commission expires:	
Total Retainage (Lines 5a + 5b or Total in Colu	nn I of G/03)	•••••	\$	0.00		
6. TOTAL EARNED LESS RETAINAGE			\$	0.00		
(Line 4 Less Line 5 Total)			_		In accordance with the Contract Documents, based on on-site observations and the data com- this application, the Architect certifies to the Owner that to the best of the Architect's know	prising
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT .			\$	0.00	information and belief the Work has progressed as indicated, the quality of the Work	k is in
(Line 6 from prior Certificate)		_			accordance with the Contract Documents, and the Contractor is entitled to payment	of the
8. CURRENT PAYMENT DUE			\$	0.00		
9. BALANCE TO FINISH, INCLUDING RETAINAGE					AMOUNT CERTIFIED\$ 0.00	1.
(Line 3 less Line 6)	\$		0.00		(Attach explanation if amount certified differs from the amount applied. Initial all figures on Application and on the Continuation Sheet that are changed to conform with the amount cert	
CHANGE ORDER SUMMARY	ADDITION	NS	DEDUCTI	ONS	ARCHITECT:	
Total changes approved in previous months by Own	ner	0.00	S	0.00	By: Date:	
Total approved this Month	\$	0.00		0.00	This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Con	ntractor
TOTAL		0.00	6	0.00	named herein. Issuance, payment and acceptance of payment are without prejudice to any ri	
NET CHANGES by Change Order	\$			0.00	the Owner or Contractor under this Contract	



# **Continuation Sheet**

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT,

containing Contractor's signed certification is attached.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

**APPLICATION NO: 001** 

**APPLICATION DATE:** 

PERIOD TO:

**ARCHITECT'S PROJECT NO:** 

A	В	С	D	Е	F	G		Н	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK CO FROM PREVIOUS APPLICATION (D + E)	MPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
	GRAND TOTAL	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	0.00 %	\$ 0.00	\$ 0.00

User Notes: (660082785)



#### Utah State Tax Commission

# **Exemption Certificate for Governments & Schools**

(Sales, Use, Tourism and Motor Vehicle Rental Tax)

TC-721G Rev. 12/08

Name of institution claiming exemption (purchaser)			Telephone N	lumber
Street Address		City	 State	ZIP Code
Authorized Signature		Title		
Name of Seller or Supplier:			Date	

The person signing this certificate MUST check the applicable box showing the basis for which the exemption is being claimed. Questions should be directed (preferably in writing) to Taxpayer Services, Utah State Tax Commission, 210 N 1950 W, Salt Lake City, UT 84134. Telephone (801) 297-2200, or toll free 1-800-662-4335.

# DO NOT SEND THIS CERTIFICATE TO THE TAX COMMISSION. Keep it with your records in case of an audit.

_	UNITED STATES GOVERNMENT OR NATIVE AMERICAN TRIBE I certify the tangible personal property or services purchased are to be paid directly with funds from the entity noted on this form and will be used in the exercise of essential governmental or tribal functions. NOTE: Includes sales of tangible personal property to federally chartered credit unions. "Directly" does not include per diem, entity advances or similar indirect payments.  CONSTRUCTION MATERIALS PURCHASED FOR SCHOOLS OR PUBLIC TRANSIT DISTRICTS I certify the construction materials purchased are on behalf of a public elementary or secondary school, or public transit district. I further certify the purchased construction materials will be installed or converted into real property owned by the school or public transit district. Name of school or public transit district:	UTAH STATE AND LOCAL GOVERNMENTS AND PUBLIC ELEMENTARY AND SECONDARY SCHOOLS  Sales Tax License No.  I certify the tangible personal property or services purchased are be paid directly with funds from the entity noted on this form and very be used in the exercise of that entity's essential functions. For construction materials, if the purchaser is a Utah state or location of the converted into real property by employees of this government entiment "Directly" does not include per diem, entity advances, or similindirect payments. CAUTION: This exemption does not apply government or educational entities of other states.		
	Name of project:			

To be valid this certificate must be filled in completely, including a check mark in the proper box.

A sales tax license number is required only where indicated.

Please sign, date and, if applicable, include your license or exemption number.

NOTE TO SELLER: Keep this certificate on file since it must be available for audit review.

**NOTE TO PURCHASER:** Keep a copy of this certificate for your records. You must notify the seller of cancellation, modification, or limitation of the exemption you have claimed.

If you need an accommodation under the Americans with Disabilities Act, contact the Tax Commission at (801) 297-3811 or TDD (801) 297-2020. Please allow three working days for a response.

#### SECTION 011000 - SUMMARY

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

#### A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Access to site.
- 4. Construction schedule manpower requirements.
- 5. Coordination with occupants.
- 6. Work restrictions.
- 7. Specification and Drawing conventions.

#### B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 PROJECT INFORMATION

- A. Project Identification: Ogden High School Baseball Field Renovation.
  - 1. Project Location: 2828 Harrison Blvd, Ogden, UT 84403.
- B. Owner: Ogden School District, 1950 Monroe Blvd., Ogden, UT 84401.
- C. Architect: MHTN Architects, Inc., 280 S 400 W, Suite 250. Salt Lake City, Utah, 84101.
- D. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
  - 1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software.

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
  - 1. Remove existing backstop. Remove existing dugout.
  - 2. Remove existing infield. Remove existing baseball batting cage.
  - 3. Re-grade the baseball infield.

- 4. Install new baseball dugouts.
- Install new baseball backstop with concrete foundation wall and new pole and netting system.
- 6. Install ramps, stairs and concrete paving. Install retaining wall and regrade site as indicated in the drawings.
- 7. Install new baseball bull pen. Install new bull pen at softball field.
- 8. Relocate existing baseball scoreboard.
- 9. Remove and replace existing softball scoreboard.
- 10. Install batters' eye in center field.
- 11. Install vinyl slats in existing outfield baseball fence.
- 12. Install new warning track at baseball outfield fence.
- 13. Install new batting cage with artificial turf.
- 14. Install new clay and turf infield. .

# B. Type of Contract:

1. Project will be constructed under a single prime contract.

#### 1.5 ACCESS TO SITE

- A. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- B. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

#### 1.6 CONSTRUCTION SCHEDULE – MANPOWER REQUIREMENTS

- A. Contractors shall provide adequate personnel and extend workdays and work weeks to comply with the schedule requirements of this project.
- B. Schedule shall be as follows:
  - 1. Project out to Bid: August 18, 2022
  - 2. Mandatory Pre-Bid Walk Through: September 23, 2022 at 11 AM, Ogden High School
  - 3. Bid Due Date: September 1, 2022 at 2 PM.
  - 4. Notice to Proceed: September 16, 2022.
  - 5. Start Construction: September 16, 2022.

#### 1.7 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy Project site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways and other adjacent occupied or used facilities. Do not close or obstruct walkways or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

#### 1.8 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
  - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.

#### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
  - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

#### SECTION 012100 - ALLOWANCES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.

# C. Related Requirements:

- 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of lump sum allowances when applicable.
- 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
- 3. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

# 1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

#### 1.4 SELECTION AND PURCHASE

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

#### 1.5 ACTION SUBMITTALS

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

ALLOWANCES 012100 - 1

#### 1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

#### 1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

#### 1.8 ADJUSTMENT OF ALLOWANCES

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

ALLOWANCES 012100 - 2

PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

#### 3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

#### 3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Lump-Sum Allowance: Owner Contingency & Unforseen Conditions: Include the sum of \$50,000.00
  - 1. Coordinate allowance adjustment with unit-price requirements in Section 012200 "Unit Prices."
  - 2. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

END OF SECTION 012100

ALLOWANCES 012100 - 3

#### SECTION 012300 - ALTERNATES

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

#### 1.3 DEFINITIONS

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

#### 1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

ALTERNATES 012300 - 1

# PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

# 3.1 SCHEDULE OF ALTERNATES

#### A. Bid Alternate No. 1:

- 1. Demolish and remove existing Announcer Booth building and alter existing site utilities indicated.
- 2. Provide an Announcer Booth building and alter existing site utilities and grading indicated.

# B. Bid Alternate No. 2:

1. Provide Synthetic Grass Surface at infield areas in lieu of Turfgrass Sod and Infield Soils and alter grading indicated.

#### C. Bid Alternate No. 3:

1. Provide Chain Link Fence fabric at Backstop in lieu of Tension Ball Safety Netting.

END OF SECTION 012300

ALTERNATES 012300 - 2

#### SECTION 012500 - SUBSTITUTION PROCEDURES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Document 002600 "Procurement Substitution Procedures" for requirements for substitution requests prior to award of Contract.
  - 2. Section 012100 "Allowances" for products selected under an allowance.
  - 3. Section 012300 "Alternates" for products selected under an alternate.
  - 4. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### 1.3 DEFINITIONS

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

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

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

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 PROCEDURES

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

#### 1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
  - Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

#### SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
  - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

#### 1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

#### 1.4 PROPOSAL REQUESTS

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

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

#### 1.5 CHANGE ORDER PROCEDURES

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

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

#### SECTION 012900 - PAYMENT PROCEDURES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
  - 2. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
  - 3. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
  - 4. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 5. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

# 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.

- b. Name of Architect.
- c. Architect's Project number.
- d. Contractor's name and address.
- e. Date of submittal.
- 2. Arrange schedule of values consistent with format of AIA Document G703.
- 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest onehundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
- 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
- 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site.
- 6. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
- 7. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
- 8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

# 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 or Owner's required forms as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

- 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
- 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
- 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit two signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
  - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following, with no exceptions:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Contractor's construction schedule (preliminary if not final).
  - 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  - 5. Products list (preliminary if not final).
  - 6. Schedule of unit prices.
  - 7. Submittal schedule (preliminary if not final).
  - 8. List of Contractor's staff assignments.
  - 9. Copies of building permits.
  - Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 11. Initial progress report.
  - 12. Report of preconstruction conference.
  - 13. Certificates of insurance and insurance policies.
  - 14. Performance and payment bonds.
  - 15. Data needed to acquire Owner's insurance.

- H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
    - Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
  - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Certification of completion of final punch list items.
  - 3.
  - 4. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 5. Updated final statement, accounting for final changes to the Contract Sum.
  - 6. AIA Document G706.
  - 7. AIA Document G706A.
  - 8. AIA Document G707.
  - 9. Evidence that claims have been settled.
  - 10. Final liquidated damages settlement statement.
  - 11. Proof that taxes, fees, and similar obligations are paid.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

#### SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - RFIs.
  - 4. Digital project management procedures.
  - 5. Web-based project management software package.
  - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

#### 1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

#### 1.4 INFORMATIONAL SUBMITTALS

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

- B. Key Personnel Names: Within 5 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location inbuilt facility. Keep list current at all times.

#### 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

# 1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  - 1. Project name.
  - 2. Owner name.
  - 3. Owner's Project number.
  - 4. Name of Architect.
  - 5. Architect's Project number.
  - 6. Date.
  - 7. Name of Contractor.
  - 8. RFI number, numbered sequentially.
  - 9. RFI subject.
  - 10. Specification Section number and title and related paragraphs, as appropriate.
  - 11. Drawing number and detail references, as appropriate.
  - 12. Field dimensions and conditions, as appropriate.
  - 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 14. Contractor's signature.
  - 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
  - 1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
  - 1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
  - 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of Architect.
  - 4. RFI number, including RFIs that were returned without action or withdrawn.
  - 5. RFI description.
  - 6. Date the RFI was submitted.
  - 7. Date Architect's response was received.
  - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

#### 1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
  - 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
  - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  - 3. Digital Drawing Software Program: Contract Drawings are available in Revit 2019.
  - 4. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
    - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement included in this Project Manual.
  - 5. BIM models provided by the Architect's Consultants will require execution of separate data licensing agreements, provided by each Consultant from which the model has been requested.
- B. Project Management Software: Use Bluebeam Studio to host and manage Project communication and documentation. Coordinate with Architect on the setup, procedures and management of the system. Or provide web-based project management software as indicated below.
- C. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
  - 1. Web-based Project management software includes, at a minimum, the following features:
    - Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.

- b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
- c. Document workflow planning, allowing customization of workflow between project entities.
- d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
- e. Track status of each Project communication in real time, and log time and date when responses are provided.
- f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
- g. Processing and tracking of payment applications.
- h. Processing and tracking of contract modifications.
- i. Creating and distributing meeting minutes.
- j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
- k. Management of construction progress photographs.
- I. Mobile device compatibility, including smartphones and tablets.
- 2. Provide up to seven Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide four hours of software training at Architect's office for web-based Project software users.
- 3. Provide one of the following Project management software packages under their current published licensing agreements:
  - a. Autodesk; Constructware.
  - b. Corecon Technologies, Inc.
  - c. Meridian Systems; Prolog.
  - d. Newforma, Inc.
  - e. Procore Technologies, Inc.
- D. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- E. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
  - 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  - 2. Name file with submittal number or other unique identifier, including revision identifier.
  - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

#### 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

- 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Contractor and Architect, within seven days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
  - 1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - I. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Preparation of Record Documents.
    - o. Use of the premises.
    - p. Work restrictions.
    - q. Working hours.
    - r. Owner's occupancy requirements.
    - s. Responsibility for temporary facilities and controls.
    - t. Procedures for moisture and mold control.
    - u. Procedures for disruptions and shutdowns.
    - v. Construction waste management and recycling.
    - w. Parking availability.
    - x. Office, work, and storage areas.
    - y. Equipment deliveries and priorities.
    - z. First aid.
    - aa. Security.
    - bb. Progress cleaning.
  - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
  - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

- a. Contract Documents.
- b. Options.
- c. Related RFIs.
- d. Related Change Orders.
- e. Purchases.
- f. Deliveries.
- g. Submittals.
- h. Review of mockups.
- i. Possible conflicts.
- j. Compatibility requirements.
- k. Time schedules.
- I. Weather limitations.
- m. Manufacturer's written instructions.
- n. Warranty requirements.
- o. Compatibility of materials.
- p. Acceptability of substrates.
- q. Temporary facilities and controls.
- r. Space and access limitations.
- s. Regulations of authorities having jurisdiction.
- t. Testing and inspecting requirements.
- u. Installation procedures.
- v. Coordination with other work.
- w. Required performance results.
- x. Protection of adjacent work.
- y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
- 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion.
  - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for completing sustainable design documentation.
    - f. Requirements for preparing operations and maintenance data.
    - g. Requirements for delivery of material samples, attic stock, and spare parts.
    - h. Requirements for demonstration and training.

- i. Preparation of Contractor's punch list.
- Procedures for processing Applications for Payment at Substantial Completion and for final payment.
- k. Submittal procedures.
- I. Coordination of separate contracts.
- m. Owner's partial occupancy requirements.
- n. Installation of Owner's furniture, fixtures, and equipment.
- o. Responsibility for removing temporary facilities and controls.
- 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Architect will conduct progress meetings at intervals required by progress of the Work, typically weekly.
  - 1. Coordinate dates of meetings with preparation of payment requests.
  - Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Status of sustainable design documentation.
      - 6) Deliveries.
      - 7) Off-site fabrication.
      - 8) Access.
      - 9) Site use.
      - 10) Temporary facilities and controls.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Status of correction of deficient items.
      - 14) Field observations.
      - 15) Status of RFIs.
      - 16) Status of Proposal Requests.
      - 17) Pending changes.
      - 18) Status of Change Orders.
      - 19) Pending claims and disputes.
      - 20) Documentation of information for payment requests.

- 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings on an as-needed basis. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
  - Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Deliveries.
      - 6) Off-site fabrication.
      - 7) Access.
      - 8) Site use.
      - 9) Temporary facilities and controls.
      - 10) Work hours.
      - 11) Hazards and risks.
      - 12) Progress cleaning.
      - 13) Quality and work standards.
      - 14) Status of RFIs.
      - 15) Proposal Requests.
      - 16) Change Orders.
      - 17) Pending changes.
  - 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

Ogden High School Baseball Field Renovation Ogden School District

MHTN Project No. 2022539 Construction Documents - 18 August 2022

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

#### SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- C. Daily Construction Reports: Submit at weekly intervals.

- D. Site Condition Reports: Submit at time of discovery of differing conditions.
- E. Unusual Event Reports: Submit at time of unusual event.

#### 1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including work stages.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review submittal requirements and procedures.
  - 7. Review time required for review of submittals and resubmittals.
  - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 9. Review time required for Project closeout and Owner startup procedures.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

#### 1.6 COORDINATION

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

## 1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - 1. Adjust scheduling requirements below to match the complexity of the Project, providing sufficient information for Owner and Architect to know what to expect and when.
- B. Time Frame: Extend schedule from date established for commencement of the Work or the Notice to Proceed to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each product or system as a separate numbered activity. Comply with the following:

- 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
- Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule.
   Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
- 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
- 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
- 5. Commissioning Time: Indicate time for systems commissioning as specified in Division 23 sections.
- 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  - Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  - 2. Owner-Furnished Products: Include a separate activity for each product.
  - 3. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use-of-premises restrictions.
    - f. Seasonal variations.
  - 4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e Fabrication
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - I. Startup and placement into final use and operation.
    - m. Commissioning.
  - 5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.

- b. Temporary enclosure and space conditioning.
- c. Permanent space enclosure.
- d. Completion of mechanical installation.
- e. Completion of electrical installation.
- f. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate final completion percentage for each activity.
- H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

# 1.8 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.

- 5. Material deliveries.
- 6. High and low temperatures and general weather conditions, including presence of rain or snow.
- 7. Testing and inspection.
- 8. Accidents.
- 9. Meetings and significant decisions.
- 10. Unusual events.
- 11. Stoppages, delays, shortages, and losses.
- 12. Meter readings and similar recordings.
- 13. Emergency procedures.
- 14. Orders and requests of authorities having jurisdiction.
- 15. Change Orders received and implemented.
- 16. Construction Change Directives received and implemented.
- 17. Services connected and disconnected.
- 18. Equipment or system tests and startups.
- 19. Partial completions and occupancies.
- 20. Substantial Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
  - 1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

#### SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.

# B. Related Requirements:

- 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
- 2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
- 3. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within seven days of taking photographs.
  - 1. Submit photos by uploading to web-based project software site. Include copy of key plan indicating each photograph's location and direction.
  - 2. Identification: Provide the following information with each image description in web-based project software site:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of location, vantage point, and direction.
    - g. Unique sequential identifier keyed to accompanying key plan.

## 1.4 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time and GPS location data from camera.
- D. File Names: Name media files with date and sequential numbering suffix.

#### 1.5 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Flag construction limits before taking construction photographs.
  - 2. Take a minimum of 20 photographs to show existing conditions of building exteriors, roofs and site, including areas that may be affected by construction traffic and staging.
  - 3. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 4. Take additional photographs as required to record settlement or cracking of structures, pavements, and improvements.
- C. Periodic Construction Photographs: Take 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

#### SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

# B. Related Requirements:

- Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 4. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
- 5. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 6. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 7. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 8. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 9. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

# 1.3 DEFINITIONS

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

## 1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled dates for purchasing.
    - h. Scheduled date of fabrication.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

# 1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
  - 1. Project name.
  - 2. Date.
  - Name of Architect.
  - 4. Name of Contractor.
  - 5. Name of firm or entity that prepared submittal.
  - 6. Names of subcontractor, manufacturer, and supplier.
  - 7. Category and type of submittal.
  - 8. Submittal purpose and description.
  - 9. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
  - 10. Drawing number and detail references, as appropriate.
  - 11. Indication of full or partial submittal.
  - 12. Location(s) where product is to be installed, as appropriate.
  - 13. Other necessary identification.
  - 14. Remarks.
  - 15. Signature of transmitter.

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- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file.

  Name PDF file with submittal number.

#### 1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
    - Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
  - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  - 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

- Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

## 1.7 SUBMITTAL REQUIREMENTS

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

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

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- 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  - 2. Manufacturer and product name, and model number if applicable.
  - 3. Number and name of room or space.
  - 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

## G. Certificates:

- Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
- Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

# H. Test and Research Reports:

- Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

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- 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- 6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.

#### 1.8 DELEGATED-DESIGN SERVICES

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

# 1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. <u>Architect will not review submittals received from Contractor that do not have Contractor's review and approval.</u>

## 1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
  - Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
  - 2. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

#### SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 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.
  - 4. Specific test and inspection requirements are not specified in this Section.

## 1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

## 1.4 DELEGATED-DESIGN SERVICES

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

## 1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.6 ACTION SUBMITTALS

- A. Shop Drawings: For mockups.
  - 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
  - 2. Indicate manufacturer and model number of individual components.
  - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Contractor's quality-control personnel.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- D. Reports: Prepare and submit certified written reports and documents as specified.
- E. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

## 1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.
- B. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- C. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.
- D. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- E. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

### 1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, telephone number, and email address of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.

- 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  - 2. Statement that equipment complies with requirements.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 4. Statement whether conditions, products, and installation will affect warranty.
  - 5. Other required items indicated in individual Specification Sections.

# 1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
  - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups of size indicated.
  - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
  - 5. Demonstrate the proposed range of aesthetic effects and workmanship.

- Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
  - a. Allow seven days for initial review and each re-review of each mockup.
- 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 8. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

## 1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  - 2. Payment for these services will be made from testing and inspection allowances, as authorized by Change Orders.
  - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
  - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 2. Engage a qualified testing agency to perform quality-control services.
    - Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
  - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

## 1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

#### 3.1 TEST AND INSPECTION LOG

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

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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END OF SECTION 014000

#### SECTION 014200 - REFERENCES

### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

## 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- "Indicated": Requirements expressed by graphic representations or in written form on
   Drawings, in Specifications, and in other Contract Documents. Other terms including "shown,"
   "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": 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.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

REFERENCES 014200 - 1

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

## 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
  - 1. IAPMO International Association of Plumbing and Mechanical Officials; www.iapmo.org.
  - 2. ICC International Code Council; www.iccsafe.org.
  - 3. ICC-ES ICC Evaluation Service, LLC; www.icc-es.org.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
  - 1. CPSC Consumer Product Safety Commission; www.cpsc.gov.
  - 2. DOC Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
  - 3. DOD Department of Defense; www.quicksearch.dla.mil.
  - 4. DOE Department of Energy; www.energy.gov.
  - 5. EPA Environmental Protection Agency; www.epa.gov.
  - 6. FG Federal Government Publications; www.gpo.gov/fdsys.
  - 7. GSA General Services Administration; www.gsa.gov.
  - 8. OSHA Occupational Safety & Health Administration; www.osha.gov.
  - 9. TRB Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
  - 10. USDA Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
  - 11. USDA Department of Agriculture; Rural Utilities Service; www.usda.gov.
  - 12. USDOJ Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
  - 13. USPS United States Postal Service; www.usps.com.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. CFR Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
  - 2. FED-STD Federal Standard; (See FS).

REFERENCES 014200 - 2

- 3. FS Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
  - a. Available from Defense Standardization Program; www.dsp.dla.mil.
  - b. Available from General Services Administration; www.gsa.gov.
  - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
- 4. USAB United States Access Board; www.access-board.gov.
- 5. USATBCB U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

REFERENCES 014200 - 3

#### SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - Section 017419 "Construction Waste Management and Disposal" for disposing of nonhazardous demolition and construction waste.

## 1.1 USE CHARGES

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

### 1.3 INFORMATIONAL SUBMITTALS

- A. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

#### 1.4 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

#### PART 2 - PRODUCTS

## 2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

#### PART 3 - EXECUTION

# 3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

## 3.2 SUPPORT FACILITIES INSTALLATION

- A. Parking: Provide temporary parking areas for construction personnel.
- B. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- C. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

# 3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
  - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  - 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

# 3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

#### SECTION 016000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012300 "Alternates" for products selected under an alternate.
  - 2. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 3. Section 014200 "References" for applicable industry standards for products specified.

#### 1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, inservice performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

- 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
  - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
  - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.

3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

#### 1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

### B. Delivery and Handling:

- 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
- 2. 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
- 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

## C. Storage:

- 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
- 2. Store products to allow for inspection and measurement of quantity or counting of units.
- 3. Store materials in a manner that will not endanger Project structure.
- 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
- 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
- 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 7. Protect stored products from damage and liquids from freezing.
- 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

#### PART 2 - PRODUCTS

## 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Architect will make selection.
  - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  - 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

#### B. Product Selection Procedures:

- 1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following."

- 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following."
- 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
  - a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: ...,"
- 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
  - a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
- 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
  - a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following."
- 6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
  - a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
- 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
  - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
  - Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.
- B. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

#### SECTION 017300 - EXECUTION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering.
  - 3. Installation.
  - 4. Cutting and patching.
  - 5. Coordination of Owner's portion of the Work.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
  - 9. Correction of the Work.

# B. Related Requirements:

- 1. Section 011000 "Summary" for coordination of, and limits on use of Project site.
- 2. Section 013300 "Submittal Procedures" for submitting surveys.
- 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
- 4. Section 024116 "Structure Demolition" for demolition and removal of existing buildings.

## 1.3 DEFINITIONS

- Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

# 1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

EXECUTION 017300 - 1

- Prior to commencing work requiring cutting and patching, review extent of work anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Coordinate conference with participants indicated in Section 024116 "Structure Demolition", regarding structure demolition work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
  - a. Contractor's superintendent.
  - b. Trade supervisors responsible for cutting operations.
  - c. Trade supervisor(s) responsible for patching of each type of substrate.
  - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
- 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of, cutting and patching.
  - 2. Changes to In-Place Construction: Describe existing site features and construction elements to remain and to be protected during demolition work.
  - Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

## 1.6 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.

- e. Plumbing piping systems.
- f. Mechanical systems piping and ducts.
- g. Control systems.
- h. Communication systems.
- i. Fire-detection and -alarm systems.
- j. Conveying systems.
- k. Electrical wiring systems.
- I. Operating systems of special construction.
- 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
  - a. Water, moisture, or vapor barriers.
  - b. Membranes and flashings.
  - c. Exterior curtain-wall construction.
  - d. Sprayed fire-resistive material.
  - e. Equipment supports.
  - f. Piping, ductwork, vessels, and equipment.
  - g. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  - Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.
  - 2. List of detrimental conditions, including substrates.
  - 3. List of unacceptable installation tolerances.
  - Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

## 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 INSTALLATION

- General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 108 inches in occupied spaces and 96 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
  - 1. Remediation of damaged, defective, or nonconforming work shall be completed with 30 days from the time it was identified.
  - Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

## 3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Where new construction requires modification, employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.

- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamondcore drill.
  - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 5. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

- 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
- 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
  - a. Use containers intended for holding waste materials of type to be stored.
- 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

## 3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

### SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Disposing of nonhazardous demolition and construction waste.

## 1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.

### 1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

### 1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- B. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

## 1.7 QUALITY ASSURANCE

- A. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

## 1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. . Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

## 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Distribute waste management plan to everyone concerned within seven days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

## 3.2 DISPOSAL OF WASTE

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

**END OF SECTION 017419** 

#### SECTION 017700 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.

## B. Related Requirements:

- 1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
- 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
- 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

# 1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

## 1.4 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

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

## 1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
  - Submit a final Application for Payment according to Section 012900 "Payment Procedures."

- Certified List of Incomplete Items: Submit certified copy of Architect's Substantial
   Completion inspection list of items to be completed or corrected (punch list), endorsed
   and dated by Architect. Certified copy of the list shall state that each item has been
   completed or otherwise resolved for acceptance.
- 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- 4. Submit final completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  - 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

# 1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  - 4. Submit list of incomplete items in one of the following formats:
    - a. PDF electronic file. Architect will return annotated file.
    - b. Web-based project software upload. Utilize software feature for transmitting and updating list of incomplete items (punch list).

# 1.7 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - Submit on digital media acceptable to Architect or by uploading to web-based project software site.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

### PART 2 - PRODUCTS

## 2.1 MATERIALS

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

# PART 3 - EXECUTION

## 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- h. Remove labels that are not permanent.
- i. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- j. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

#### SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

## 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

## 1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit on digital media acceptable to Architect by uploading to web-based project software site. Enable reviewer comments on draft submittals.
  - 2. Submit two paper copies. Architect will return two copies for transmittal to the Owner.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  - Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

### 1.5 FORMAT OF MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size
  - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
  - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name,[ and] subject matter of contents[, and indicate Specification Section number on bottom of spine]. Indicate volume number for multiple-volume sets.
  - Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual.
     Mark each tab to indicate contents. Include typed list of products and major components
     of equipment included in the section on each divider, cross-referenced to Specification
     Section number and title of Project Manual.
  - Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
  - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

- a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 1.6 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - Manual contents.
- B. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.
  - 6. Name and contact information for Construction Manager.
  - 7. Name and contact information for Architect.
  - 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  - 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

### 1.7 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

#### SECTION 017839 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

# 1.3 CLOSEOUT SUBMITTALS

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

- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

### 1.4 RECORD DRAWINGS

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

- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
  - 1. Format: Annotated PDF electronic file with comment function enabled.
  - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  - 3. Refer instances of uncertainty to Architect for resolution.
  - 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Format: Annotated PDF electronic file.
  - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  - 4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## 1.5 RECORD SPECIFICATIONS

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

## 1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- C. Format: Submit record Product Data as annotated PDF electronic file.
  - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
  - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

### 1.8 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 - PRODUCTS

PART 3 - EXECUTION

**END OF SECTION 017839** 

#### SECTION 024116 - STRUCTURE DEMOLITION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

### A. Section Includes:

- 1. Demolition and removal of buildings.
- 2. Removing below-grade construction.
- 3. Disconnecting, capping or sealing, and removing site utilities.

## B. Related Requirements:

- 1. Section 011000 "Summary" for use of the premises and phasing requirements.
- 2. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.
- 3. Section 017300 "Execution" for cutting and patching requirements.
- 4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

## 1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.

## 1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

### 1.5 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
  - Prior to commencing demolition work, review extent of work anticipated and examine procedures for ensuring satisfactory results. Coordinate conference with participants indicated in Section 017300 "Execution", regarding cutting and patching work. Require representatives of each entity directly concerned with demolition to attend, including the following:
    - a. Contractor's superintendent.
    - b. Trade supervisors responsible for demolition operations.
    - c. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by demolition operations.

- 2. Inspect and discuss condition of construction to be demolished.
- 3. Review procedures for noise control and dust control.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Demolition Plan: Submit plan describing procedures at least 10 days prior to the time structure demolition will be performed. Include the following information:
  - 1. Extent and Intent: Describe limit lines of site area to be affected by structure demolition and intended work methods to be used with regards to demolition, dust control, on-site storage and waste removal of materials.
  - 2. Dates: Indicate when structure demolition will be performed.
  - 3. Temporary interruption of utility services.
  - 4. Shutoff and capping or re-routing of utility services.
- B. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

## 1.7 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. On-site storage or sale of removed items or materials is not permitted.

## 1.8 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

## 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
  - 1. Owner will arrange to shut off utilities when requested by Contractor.
  - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  - 3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
  - 4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

## 3.3 PROTECTION

- A. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
    - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

## 3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  - 2. Maintain adequate ventilation when using cutting torches.
  - 3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

- 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
- 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

### 3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
  - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- C. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

## 3.6 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

## 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

## 3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

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1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

### SECTION 024119 - SITE DEMOLITION

### PART 1 - GENERAL

### 0.1 SUMMARY:

- A. Section includes requirement for demolition work.
  - 1. Verify existing utilities to be removed as well as site features to be demolished with owner and engineer.
- B. Demolition includes, but is not limited to, the removal of the following items within the demolition limit lines:
  - Sidewalks
  - 2. Curbwalls
  - 3. Curb and Gutter
  - Paving
  - 5. Concrete Slabs
  - 6. Water Lines and Meters
  - 7. Gas Lines
  - 8. Fencing
  - 9. Building Structures (below and above grade)
  - 10. Unmarked Trees and all their Roots
  - 11. Tree Stumps and all their Roots
  - 12. Minor Overhead Utility Lines and Poles
  - 13. Sod, Lawn and all irrigated wet soils
  - 14. Shrubs and all their Roots
  - 15. Underground Structures including Septic Tanks, vaults, Basements
  - 16. Paint Obliteration
- C. Related Sections
  - Refer to Section 02300 for earthwork requirements.
- D. Drawings and general provisions of contract, including general and supplementary Conditions and site clearing specifications apply to work in this section.

# 0.2 SUBMITTALS:

- A. Schedule: Submit proposed methods and operations of demolition to review prior to start of work. Include in schedule coordination for shut-off, capping, and continuation of utility services as required.
- B. Explosives: The use of explosives is not permitted.
- C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
  - Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulation.

SITE DEMOLITION 024119 - 1

- D. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
  - 1. Erect temporary covered passageways as required by authorities having jurisdiction.
  - 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.
- E. Damage: Promptly repair damage caused to adjacent facilities by demolition operations.
  - Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
- F. Hazardous Materials Removal:
  - 1. When hazardous materials are encountered, notify the Owner immediately.

## PART 1 - PRODUCTS

Not used.

#### PART 2 - EXECUTION

- A. Demolition:
  - Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
    - a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
    - Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by Architect or governing authorities. Return adjacent areas to condition existing prior to start of work.
- B. Cutting Asphalt, Concrete and Concrete Block: Saw cut asphalt paving, concrete slabs and concrete block walls with approved saws at lines and levels indicated on drawings. Saw cut concrete walks and curbs only if they cannot be removed to an existing control joint.
- C. Capping and Abandonment: Cap all abandoned lines and conduits and drains in accordance with requirements of Utility Companies having jurisdiction. Remove abandoned lines, unless otherwise noted.
- D. Overhead Utility Lines: The Utility companies that own or otherwise control the overhead utility lines, will remove and relocate their poles and overhead utility lines at the Owner's expense. The Contractor shall coordinate these utility changes with the proper utility companies.
- E. Permits: Contractor is required to obtain a Demolition Permit and Utility Disconnection Permits from the City and utility companies.
  - 1. Record on Record Document location and extent of all capped and abandoned lines below grade.
- F. Relocation: Relocate utilities as indicated. Work performed for relocation of utilities to conform to new utility line construction.

SITE DEMOLITION 024119 - 2

### 2.1 DISPOSAL OF DEMOLISHED MATERIALS:

A. General: remove from site debris, rubbish, and other materials resulting from demolition operations and dispose in a legal manner.

# 2.2 BACKFILL

- A. Excavated areas associated with the removal of all substructures should be backfilled with a well-graded granular material having a maximum size of 2 inches and not more than 15 percent passing a #200 sieve. All earth materials placed in excavated areas should be placed in maximum eight inch loose lifts and densified to an in-place unit weight equal to 95% of the Maximum Laboratory Density as determined by ASTM D 1557-78.
  - 1. Refer to section 02300 for placement and compaction requirements.

END OF SECTION 024119

SITE DEMOLITION 024119 - 3

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

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

### A. Section Includes:

- Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.
- 2. Form-facing material for cast-in-place concrete.
- 3. Shoring, bracing, and anchoring.
- 4. Steel reinforcement bars.

### B. Related Requirements:

- 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
- 2. Section 321313 "Concrete Paving" for cast-in-place concrete, formwork and reinforcing related to exterior non-structural concrete.

# 1.3 DEFINITIONS

- A. Retain terms that remain after this Section has been edited for a project.
- B. Definition in "Cementitious Materials" Paragraph below refers to those materials that make up the cementitious component of the water/cement ratio (w/cm).
- C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- D. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.
- E. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- F. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

# 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1. Review the following:

- a. Special inspection and testing and inspecting agency procedures for field quality control.
- b. Forms and form-removal limitations.
- c. Shoring and reshoring procedures,.
- d. Anchor rod and anchorage device installation tolerances
- e. Construction contraction and isolation joints.
- f. Steel reinforcement installation.
- g. Vapor-retarder installation.
- h. Concrete finishes and finishing.
- i. Curing procedures.
- j. Concrete repair procedures.
- k. Concrete protection.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each of the following.
  - 1. Portland cement.
  - 2. Fly ash.
  - 3. Aggregates.
  - 4. Admixtures:
    - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
  - 5. Vapor retarders.
  - 6. Curing materials.
  - 7. Joint fillers.
  - 8. Exposed surface form-facing material.
  - 9. Concealed surface form-facing material.
  - 10. Form ties.
  - 11. Form-release agent.
  - 12. Each type of steel reinforcement.
  - 13. Bar supports.
  - 14. Mechanical splice couplers.
  - 15. Repair materials.

## B. Shop Drawings: Comply with ACI SP-066:

- 1. Include placing drawings that detail fabrication, bending, and placement.
- 2. Include locations of vertical chamfer strips, symmetrical form tie spacing and weep holes at exposed faces of retaining walls.
- 3. For exposed vertical concrete walls, site walls and seat walls, indicate dimensions and form tie locations.
- 4. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- 5. Include locations of proposed construction and contraction joints. Locations of joints are subject to approval of the Architect.

C. Samples: For vapor retarder.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For the following, from a qualified testing agency:
  - Portland cement.
  - 2. Fly ash.
  - 3. Aggregates.
  - 4. Admixtures.
  - Steel Reinforcement:
    - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
  - 6. Mechanical splice couplers.
- B. Research Reports:
  - 1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
  - 2. For sheet vapor retarder, showing compliance with ICC AC380.
- C. Preconstruction Test Reports: For each mix design.
- D. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code Reinforcing Steel."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

## 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
  - 1. Include the following information in each test report:
    - Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. and to avoid damaging coatings on steel reinforcement.
  - 1. Store reinforcement to avoid contact with earth.

#### 1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
  - 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 3. Do not use frozen materials or materials containing ice or snow.
  - 4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
  - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
  - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

- 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
- 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. As-Cast Surface Form-Facing Material:
  - 1. Provide continuous, true, and smooth concrete surfaces.
  - 2. Furnish in largest practicable sizes to minimize number of joints.
  - 3. Acceptable Materials:
    - Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      - 1) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
- D. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
  - 1. Provide lumber dressed on at least two edges and one side for tight fit.

## 2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: As indicated in General Structural Notes.

### 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Mechanical Splice Couplers: Type 1 or Type 2, as indicated in Drawings, same material of reinforcing bar being spliced; tension-compression type.

- D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
  - 1. Finish: Plain.

## 2.5 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

### 2.6 CONCRETE MATERIALS

- A. Source Limitations:
  - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
  - Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
  - 3. Obtain aggregate from single source.
  - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, as indicated in General Structural Notes.
  - 2. Fly Ash: ASTM C618, as indicated in General Structural Notes.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 1 inch nominal. Refer to General Structural Notes for limitations.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

## 2.7 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

### 2.8 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water-vapor permeance of 0.01 perms; not less than thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil) or comparable product by one of the following:
    - a. ISI Building Products.
    - b. Tex-Trude.
    - c. W.R. Meadows, Inc.

#### 2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
    - a. BASF Corporation; MasterKure ER 50.
    - b. ChemMasters, Inc; Spray-Film.
    - c. Euclid Chemical Company (The); an RPM company; Eucobar.
    - d. Laticrete International, Inc.; L&M E-CON.
    - e. Sika Corporation; SikaFilm.
    - f. W.R. Meadows, Inc; EVAPRE.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
  - 1. Color:
    - a. Ambient Temperature Below 50 deg F: Black.
    - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
    - c. Ambient Temperature Above 85 deg F: White.
- D. Curing Paper: Eight-feet-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
    - a. Fortifiber Building Systems Group; Sisalkraft SK-10.
- E. Water: Potable or complying with ASTM C1602/C1602M.
- F. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
  - a. BASF Corporation; MasterKure CC 1315WB.
  - b. Euclid Chemical Company (The); an RPM company; Aqua Cure VOX.
  - c. Laticrete International, Inc.; Dress & Seal WB.
  - d. Nox-Crete Products Group; Cure & Seal 100 E.
  - e. SpecChem, LLC; Cure & Seal WB.
  - f. W.R. Meadows, Inc; Vocomp-20.
- G. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
    - a. Euclid Chemical Company (The); an RPM company; Super Diamond Clear VOX.
    - b. Laticrete International, Inc.; L&M Dress & Seal WB 25.
    - c. Nox-Crete Products Group; Cure & Seal 250E.
    - d. SpecChem, LLC; Cure & Seal WB 25.
    - e. W.R. Meadows, Inc; Vocomp-30.

#### 2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- C. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
- G. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form release agent for form liners shall be acceptable to form liner manufacturer.
- I. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal cone snap ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

- 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- J. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

#### 2.11 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  - Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

## 2.12 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass, unless indicated otherwise in General Structural Notes.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.
- D. Proportion normal-weight and light weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: As indicated in General Structural Notes.
  - 2. Maximum Water-Cementitious Materials Ratio: As indicated in General Structural Notes.
  - 3. Slump Limit: As indicated in General Structural Notes.

4. Air Content: As indicated in General Structural Notes.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.
- C. Limit concrete surface irregularities as follows:
  - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch, for concealed surfaces.
  - 2. Surface Finish-3.0: ACI 117 Class A, 1/8 inch, for exposed surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
  - 3. Minimize joints.
  - 4. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  - 1. Provide and secure units to support screed strips
  - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  - Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  - 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
  - 1. Determine sizes and locations from trades providing such items.
  - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

#### L. Construction and Movement Joints:

- 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
- 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- 3. Place joints perpendicular to main reinforcement.
- 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
  - Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
- 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
- 6. Space vertical joints in walls as indicated on Drawings.
  - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

## 3.2 EMBEDDED ITEMS

- A. Specify embedded items and anchorage devices for other work attached to or supported by cast-in-place concrete. Insert specific requirements for installing embedded items, if any, that are part of the Work.
- B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
  - 5. Clean embedded items immediately prior to concrete placement.

### 3.3 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

## 3.4 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  - 1. Install vapor retarder on top surface of compacted drainage course, with longest dimension parallel with direction of concrete pour.
  - 2. Face laps away from exposed direction of concrete pour.
  - Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  - 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  - 7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

### 3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Accurately position, support, and secure reinforcement against displacement.
  - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.

- 1. Bars indicated to be continuous, and all vertical bars shall be lapped per Structural General Notes.
- 2. Stagger splices in accordance with ACI 318.
- 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
- 4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

## 3.6 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  - 2. Place joints perpendicular to main reinforcement.
    - Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

7.

- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

#### E. Doweled Joints:

- 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
- 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
  - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  - 2. Do not place concrete on vapor retarder with standing water present. De-water any standing water from vapor retarder prior to placing concrete.
  - 3. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
  - 1. If a section cannot be placed continuously, provide construction joints as indicated.
  - 2. Deposit concrete to avoid segregation.
  - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Do not place concrete floors and slabs in a checkerboard sequence.

- 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- 3. Maintain reinforcement in position on chairs during concrete placement.
- 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
- 5. Level concrete, cut high areas, and fill low areas.
- Slope surfaces uniformly to drains where required.
- 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
- 8. Do not further disturb slab surfaces before starting finishing operations.

#### 3.8 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

- 1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
  - b. Remove projections larger than 1 inch.
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 Class D.
  - e. Apply to concrete surfaces not exposed to public view.
- 2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/4 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class B.
  - e. Locations: Apply to concrete surfaces exposed to public view.
- 3. ACI 301 Surface Finish SF-3.0:
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/8 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class A.
  - e. Locations: Apply to concrete surfaces to receive a rubbed finish or to be covered with a coating or covering material applied directly to concrete.

#### A. Related Unformed Surfaces:

- 1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
- 2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

#### 3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:

- 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
- 2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
- Apply scratch finish to surfaces to receive concrete floor toppings and mortar setting beds for bonded cementitious floor finishes.

#### C. Float Finish:

- 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
- 2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
- 3. Apply float finish to surfaces to receive trowel finish.

#### D. Trowel Finish:

- 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
- 2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
- 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
- 4. Do not add water to concrete surface.
- 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
- 6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or guarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- 7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
  - a. Slabs on Ground:
    - 1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
  - 1. Coordinate required final finish with Architect before application.
  - 2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  - 2. Coordinate required final finish with Architect before application.

### 3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

## A. Filling In:

- Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
- 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
- 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

#### 3.11 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
  - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
  - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
  - 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
  - Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
  - 2. If forms remain during curing period, moist cure after loosening forms.
  - 3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
    - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
      - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
      - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
  - 1. Begin curing immediately after finishing concrete.
  - 2. Interior Concrete Floors:
    - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
      - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
        - a) Lap edges and ends of absorptive cover not less than 12-inches.

- b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
- 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
  - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
  - a) Water
  - b) Continuous water-fog spray.

## b. Floors to Receive Curing Compound:

- Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Recoat control joints after saw cutting.
- 4) Maintain continuity of coating, and repair damage during curing period.
- 5) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
- c. Floors to Receive Curing and Sealing Compound:
  - Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Recoat control joints after saw cutting.
  - 4) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

#### 3.12 CONCRETE SURFACE REPAIRS

### A. Defective Concrete:

- 1. Repair and patch defective areas when approved by Architect.
- 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

- 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
  - a. Limit cut depth to 3/4 inch.
  - b. Make edges of cuts perpendicular to concrete surface.
  - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
  - d. Fill and compact with patching mortar before bonding agent has dried.
  - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
- 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
  - Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
  - b. Compact mortar in place and strike off slightly higher than surrounding surface.
- 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

## D. Repairing Unformed Surfaces:

- Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
  - a. Correct low and high areas.
  - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
- 2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
- 3. After concrete has cured at least 28 days, correct high areas by grinding.
- 4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
  - a. Finish repaired areas to blend into adjacent concrete.
- 5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
  - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  - b. Feather edges to match adjacent floor elevations.
- 6. Correct other low areas scheduled to remain exposed with repair topping.
  - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
  - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

- 7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
  - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
  - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
  - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
  - d. Place, compact, and finish to blend with adjacent finished concrete.
  - e. Cure in same manner as adjacent concrete.
- 8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
  - Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
  - b. Dampen cleaned concrete surfaces and apply bonding agent.
  - c. Place patching mortar before bonding agent has dried.
  - d. Compact patching mortar and finish to match adjacent concrete.
  - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

#### 3.13 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
  - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.

- 6) Date and time of concrete placement.
- 7) Location in Work of concrete represented by samples.
- 8) Date and time sample was obtained.
- 9) Truck and batch ticket numbers.
- 10) Design compressive strength at 28 days.
- 11) Concrete mixture designation, proportions, and materials.
- 12) Field test results.
- 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
- 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
  - Headed bolts and studs.
  - 2. Verification of use of required design mixture.
  - 3. Concrete placement, including conveying and depositing.
  - 4. Curing procedures and maintenance of curing temperature.
  - 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
  - 6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
  - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C143/C143M:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
    - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 4. Concrete Temperature: ASTM C1064/C1064M:
    - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

- 5. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
- 6. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
- 7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
- 8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 9. Additional Tests:
  - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
  - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
    - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
- 10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

#### SECTION 042200 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Concrete masonry units.
- 2. Decorative concrete masonry units.
- 3. Mortar and grout.
- 4. Steel reinforcing bars.
- 5. Masonry-joint reinforcement.
- 6. Miscellaneous masonry accessories.

### B. Related Requirements:

- 1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
- 2. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.

### 1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples for Initial Selection:

- 1. Decorative CMUs, in the form of small-scale units.
- D. Samples for Verification: For each type and color of the following:
  - Decorative CMUs.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include data on material properties.
    - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 3. Mortar admixtures.
  - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 5. Grout mixes. Include description of type and proportions of ingredients.
  - 6. Reinforcing bars.
  - 7. Joint reinforcement.
  - 8. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6 using the Prism Test Method or the Unit Strength Method.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.7 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.
    - a. Include a sealant-filled joint at least 16 inches in each exterior wall mockup.

- b. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
- 2. Protect accepted mockups from the elements with weather-resistant membrane.
- 3. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
  - Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

### 1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg Fand higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

#### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
  - 1. Subject to compliance with requirements, provide products by one of the following:
    - a. Amcor Masonry Products.
    - b. Sunroc Masonry
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Provide concrete unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

## 2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

### 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
  - 3. Provide double-bullnose wall caps at locations shown on drawings.

### B. CMUs: ASTM C90.

- 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated in the General Structural Notes.
- 2. Density Classification: As indicated in the General Structural Notes.
- 3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
- 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- 5. Corners: Mitered.

### C. Decorative CMUs: ASTM C90.

- 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated in the General Structural Notes.
- 2. Density Classification: As indicated in the General Structural Notes.
- 3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
- 4. Pattern and Texture:
  - a. Standard pattern, ground-face finish. Match Architect's samples.
  - b. Standard pattern, split-face finish. Match Architect's samples.
- 5. Colors: Match Architect's samples.
- 6. Special Aggregate: Provide units made with aggregate matching aggregate in Architect's sample.
- 7. Corners: Mitered.

### 2.5 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

#### 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
- E. Mortar Cement: ASTM C1329/C1329M.
- F. Aggregate for Mortar: ASTM C144.
  - For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C404.
- H. Water: Potable.

#### 2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inchsteel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951/A951M.
  - 1. Interior Walls: Mill- galvanized carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized carbon steel.
  - 3. Wire Size for Side Rods: 0.148-inch diameter.
  - 4. Wire Size for Cross Rods: 0.148-inch diameter.
  - 5. Spacing of Cross Rods: Not more than 16 inches o.c.
  - 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

## 2.8 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
  - 2. Stainless Steel Wire: ASTM A580/A580M, Type 304.
  - 3. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
  - 4. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
  - 5. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick steel sheet, galvanized after fabrication.
    - a. 0.064-inch thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
  - 3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.
    - 0.064-inch thick, galvanized sheet may be used at interior walls unless otherwise indicated.
- E. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

### 2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

#### 2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
    - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company; 202 New Masonry Detergent.
    - b. PROSOCO, Inc; Sure Klean® 600.

### 2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or as needed to provide required compressive strength of masonry.
  - 1. For reinforced masonry, use Type S.
  - 2. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C476.
  - 1. Refer to General Structural Notes.
  - 2. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

#### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

#### 3.3 TOLERANCES

### A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2-inch total.

#### B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet or 1/2-inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inchmaximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
- 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

### C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
- 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

#### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
  - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Set trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water
  - 2. Allow cleaned surfaces to dry before setting.

- 3. Wet joint surfaces thoroughly before applying mortar.
- 4. Rake out mortar joints for pointing with sealant.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

## 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

#### 3.7 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

### 3.8 REINFORCED UNIT MASONRY

- A. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  - 2. Limit height of vertical grout pours to not more than 60 inches.

### 3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

- Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

### 3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

#### 3.11 MASONRY WASTE DISPOSAL

A. Masonry Waste: Remove excess masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

#### SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Structural steel.
- 2. Shear stud connectors.
- 3. Shrinkage-resistant grout.

## B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.
- 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting requirements.

### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

#### 1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

### 1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.6 ACTION SUBMITTALS

#### A. Product Data:

- 1. Structural-steel materials.
- 2. High-strength, bolt-nut-washer assemblies.
- 3. Shear stud connectors.
- 4. Anchor rods.
- 5. Shop primer.
- 6. Galvanized-steel primer.
- 7. Etching cleaner.
- 8. Galvanized repair paint.
- 9. Shrinkage-resistant grout.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment Drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  - 5. Identify members and connections of the seismic-load-resisting system.
  - 6. Indicate locations and dimensions of protected zones.
  - 7. Identify demand-critical welds.
  - 8. Identify members not to be shop primed.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:
  - 1. Power source (constant current or constant voltage).
  - 2. Electrode manufacturer and trade name, for demand-critical welds.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer, fabricator and shop-painting applicators.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
  - 1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
  - 2. Direct-tension indicators.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shear stud connectors.
- F. Survey of existing conditions.

- G. Source quality-control reports.
- H. Field quality-control reports.

#### 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified in accordance with AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3.
- D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
  - Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. ANSI/AISC 303.
  - 2. ANSI/AISC 341.

- 3. ANSI/AISC 360.
- 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
  - 1. Connection designs have been completed and connections indicated on the Drawings.

#### 2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M
- B. Channels, Angles, M-Shapes, S-Shapes: ASTM A36/A36M
- C. Plate and Bar: ASTM A36/A36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
  - 1. Weight Class: As indicated.
  - 2. Finish: Black except where indicated to be galvanized.
- F. Steel Castings: ASTM A216/A216M, Grade WCB, with supplementary requirement S11.
- G. Welding Electrodes: Comply with AWS requirements.

### 2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex round head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
  - 1. Finish: Plain, unless noted otherwise.
- C. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

## 2.4 RODS

- A. Unheaded Anchor Rods: As indicated.
  - 1. Configuration: As indicated.
  - 2. Nuts: ASTM A563 heavy-hex carbon steel.
  - 3. Plate Washers: ASTM A36/A36M carbon steel.

- 4. Washers: ASTM F436, Type 1, hardened carbon steel.
- 5. Finish: As indicated.
- B. Headed Anchor Rods: Grade as indicated, straight.
  - 1. Nuts: ASTM A563 heavy-hex carbon steel.
  - 2. Plate Washers: ASTM A36/A36M carbon steel.
  - 3. Washers: ASTM F436, Type 1, hardened carbon steel.
  - 4. Finish: As indicated.

#### 2.5 PRIMER

- A. Steel Primer:
  - 1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanized-Steel Primer: MPI#134.
  - 1. Etching Cleaner: MPI#25, for galvanized steel.
  - 2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

### 2.6 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

### 2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.

- F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
- H. Welded-Steel Door Frames: Build up welded-steel door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated on Drawings.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

#### 2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: As indicated.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

### 2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
  - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

### 2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.

- 2. Surfaces to be field welded.
- 3. Surfaces of high-strength bolted, slip-critical connections.
- 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
- 5. Galvanized surfaces unless indicated to be painted.
- 6. Corrosion-resisting (weathering) steel surfaces.
- 7. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
  - 1. SSPC-SP 3.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
  - 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  - 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E165/E165M.
    - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    - c. Ultrasonic Inspection: ASTM E164.
    - d. Radiographic Inspection: ASTM E94/E94M.
  - 4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
    - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
    - Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
  - 5. Prepare test and inspection reports.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
  - 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.

- 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect/Structural Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

#### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
  - 1. Joint Type: As indicated.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

### 3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
  - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.

- 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  - 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
    - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
      - Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      - 3) Ultrasonic Inspection: ASTM E164.
      - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

### SECTION 053100 - STEEL DECKING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - Roof deck.
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- D. Evaluation Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

# 1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."
- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

#### 2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. ASC Profiles, Inc.
  - Nucor Corp.
  - 3. Verco Decking, Inc., a Nucor company.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating.
  - 2. Deck Profile: As scheduled.
  - 3. Profile Depth: As scheduled.
  - Design Uncoated-Steel Thickness: As scheduled.
  - 5. Span Condition: Triple span or more.
  - 6. Side Laps: Interlocking seam.

## 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi , not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A 780/A 780M SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

## 3.3 ROOF-DECK INSTALLATION

- A. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- B. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld ormechanically fasten.
- C. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- D. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

## 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

#### 3.5 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

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1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

END OF SECTION 053100

#### SECTION 055213 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Steel railings.
  - 2. Stainless steel railings.
- B. Related Requirements:
  - 1. Section 099123 "Interior Painting" for finish at interior railings.

#### 1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Fasteners.
  - 3. Post-installed anchors.
  - Handrail brackets.
  - 5. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
  - 1. Sections of each linear railing member, including finish.

- 2. Fittings and brackets.
- D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.6/D1.6M, "Structural Welding Code Stainless Steel."

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

#### 1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
- b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  - Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

### 2.4 STEEL RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.

### 2.5 STAINLESS STEEL RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Tubing: ASTM A554, Grade MT 316L.
- C. Castings: ASTM A743/A743M, Grade CF 8M or CF 3M.
- D. Plate and Sheet: ASTM A240/A240M or ASTM A666, Type 316L.

### 2.6 FASTENERS

## A. Fastener Materials:

- 1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
- 2. Hot-Dip Galvanized Railing Components: Type 316 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
- 3. Stainless Steel Railing Components: Type 316 stainless steel fasteners.

- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.
- C. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 for mechanical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

#### 2.7 MISCELLANEOUS MATERIALS

- A. Handrail Brackets: Cast iron, center of handrail 2 inches from face of railing.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- F. Intermediate Coats and Topcoats: Provide products that comply with Section 099123 "Interior Painting."
- G. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- H. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- I. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- J. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- K. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

### 2.8 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
  - 1. Clearly mark units for reassembly and coordinated installation.
  - 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
  - Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
  - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water.
  - 1. Provide weep holes where water may accumulate.
  - 2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
- I. Form Changes in Direction as Follows:
  - 1. By bending.
- A. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- B. Close exposed ends of railing members with prefabricated end fittings.

- C. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- D. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- A. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
  - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
  - 2. Coordinate anchorage devices with supporting structure.
- B. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

## 2.9 STEEL AND IRON FINISHES

- A. Galvanized Railings:
  - 1. Hot-dip galvanize indicated steel railings, including hardware, after fabrication.
  - 2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
  - 3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
  - 4. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
  - 1. Shop prime uncoated railings with universal shop primer unless zinc-rich primer is indicated.
  - 2. Do not apply primer to galvanized surfaces.
- F. Shop-Painted Finish: Comply with Section 099123 "Interior Painting."
  - Color: Match Architect's sample.

## 2.10 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

- 1. Run grain with long dimension of each piece.
- 2. When polishing is completed, passivate and rinse surfaces.
- 3. Remove embedded foreign matter and leave surfaces chemically clean.
- C. Stainless Steel Pipe and Tubing Finishes:
  - 1. 180-Grit Polished Finish: Uniform, directionally textured finish.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
  - 1. Fit exposed connections together to form tight, hairline joints.
  - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
  - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
  - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

## 3.3 ANCHORING POSTS

- A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

### 3.4 ATTACHING RAILINGS

- A. Attach handrails to walls with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
  - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
  - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- B. Secure wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.

### 3.5 REPAIR

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

#### 3.6 CLEANING

A. Clean railings by washing thoroughly with clean water and soap and rinsing with clean water.

#### 3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055213

#### SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Wood products.
- 2. Wood-preservative-treated lumber.
- 3. Dimension lumber framing.
- Miscellaneous lumber.

### B. Related Requirements:

- 1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
- 2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. Lumber grading agencies, and abbreviations used to reference them, include the following:
  - 1. NLGA: National Lumber Grades Authority.
  - 2. WCLIB: West Coast Lumber Inspection Bureau.
  - 3. WWPA: Western Wood Products Association.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

### 1.5 INFORMATIONAL SUBMITTALS

### A. Material Certificates:

- 1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- 2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Power-driven fasteners.
  - 2. Metal framing anchors.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

#### PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

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

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber to a maximum moisture content of 19 percent. Treat indicated items and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood floor plates that are installed over concrete slabs-on-grade.

### 2.3 DIMENSION LUMBER FRAMING

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Provide framing of grades and species as indicated on Structural Drawings.

### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Furring.
  - 5. Grounds.
- B. Dimension Lumber Items: Unless noted otherwise, provide grade and species as indicated on Structural Drawings.
- C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:
  - 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
  - 2. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

### 2.5 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308, as appropriate for the substrate.

## 2.6 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.
  - 1. Thickness: 0.050 inch.
- D. I-Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.
  - 1. Thickness: 0.050 inch.
- E. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
  - 1. Strap Width: 1-1/2 inches.
  - 2. Thickness: 0.050 inch.
- F. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

- G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

Width: 3/4 inch.
 Thickness: 0.050 inch.
 Length: As indicated.

- I. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

Bolt Diameter: 3/4 inch
 Width: 2-1/2 inches

3. Body Thickness: 0.108 inch

4. Base Reinforcement Thickness: 0.108 inch

- M. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
- N. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

### 2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
  - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
  - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. ICC-ES evaluation report for fastener.
- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

## 3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

#### 3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

### 3.4 INSTALLATION OF FLOOR JOIST FRAMING

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inchesof bearing on wood or metal, or 3 incheson masonry.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than 2 inches from top or bottom.
- E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c, extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
  - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.

2. Steel bridging installed to comply with bridging manufacturer's written instructions.

#### 3.5 INSTALLATION OF STAIR FRAMING

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
  - 1. Size: 2-by-12-inch nominal size, minimum.
  - 2. Material: Solid lumber.
  - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
  - 4. Spacing: At least three framing members for each 36-inch clear width of stair.
- B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

#### 3.6 PROTECTION

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

END OF SECTION 061000

#### SECTION 061600 - SHEATHING

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

### A. Section Includes:

- 1. Roof sheathing.
- 2. Subflooring.
- 3. Soffit and exposed exterior ceiling sheathing at dugouts.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
  - 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
  - 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preservative-treated plywood.
  - 2. Fire-retardant-treated plywood.

## 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
  - 1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs

inspections to verify that the material bearing the classification marking is representative of the material tested.

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

# 2.2 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

## 2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

### 2.4 ROOF SHEATHING

- A. Plywood Sheathing: DOC PS 1, Structural I sheathing.
  - 1. Span Rating: See Structural General Notes
  - 2. Nominal Thickness: See Structural General Notes

## 2.5 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Structural I, C-C Plugged single-floor panels.
  - 1. Span Rating: See General Structural Notes
  - 2. Nominal Thickness: See General Structural Notes
  - 3. Edge Detail: Tongue and groove.
  - 4. Surface Finish: Fully sanded face.

#### 2.6 SOFFIT AND CEILIING SHEATHING

A. Plywood Sheathing: DOC PS 1, ACX grade, 3/4" thick.

### 2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

### 2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 or ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

### PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Combination Subfloor-Underlayment:
    - a. Glue and nail to wood framing.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.
  - 2. Wall and Roof Sheathing:
    - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
    - b. Screw to cold-formed metal framing.
    - c. Space panels apart at edges and ends.
  - 3. Soffit and Ceiling Sheathing:
    - a. Screw to metal roof deck with sanded side of wood panel exposed.
    - b. Cover seams with nominal 7/16 inch x 1 ¼ inch pine wood batten strips nailed to wood panels with brad nails.

END OF SECTION 061600

#### SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

### PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

- 1. Wood roof trusses.
- 2. Wood truss bracing.
- 3. Metal truss accessories.

### 1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plateconnected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
  - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  - 2. Indicate sizes, stress grades, and species of lumber.
  - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Metal-plate connectors.
  - Metal truss accessories.

### 1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.
- D. Forest Certification: Provide wood products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship.
- E. Recycled Content of Steel Products: Provide steel products with postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

## 2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Provide dry lumber with 15 percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry" and section 061053 "Miscellaneous Rough Carpentry."

## 2.3 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpine Engineered Products, Inc.; an ITW company.
  - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
  - 3. CompuTrus, Inc.
  - 4. Eagle Metal Products.
  - 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
  - 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
  - 7. Robbins Engineering, Inc.
  - 8. Truswal Systems Corporation; an ITW company.
- B. General: Fabricate connector plates to comply with TPI 1.
- C. Hot-Dip Galvanized-Steel Sheet: 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 inch thick.

## 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
  - 2. Where trusses are exposed to weather, in ground contact, made from pressurepreservative treated wood, or in area of high relative humidity, provide fasteners with hotdip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

# 2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cleveland Steel Specialty Co.
  - 2. KC Metals Products, Inc.
  - 3. Phoenix Metal Products, Inc.
  - 4. Simpson Strong-Tie Co., Inc.
  - 5. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated or of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational

- engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

## 2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- F. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Section 061000 "Rough Carpentry" and section 061053 "Miscellaneous Rough Carpentry."
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.

### END OF SECTION 061753

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

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

#### A. Section Includes:

- Plastic-laminate-clad architectural cabinets.
- 2. Cabinet hardware and accessories.
- 3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

### 1.3 COORDINATION

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

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show large-scale details.
  - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
- A. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
  - 1. Plastic laminates.
  - 2. Thermoset polyester overlays.

- C. Samples for Verification: For the following:
  - 1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
    - a. Provide one sample applied to core material with specified edge material applied to one edge.
  - 2. Thermoset Decorative Panels: 8 by 10 inches, for each color, pattern, and surface finish.
    - a. Provide edge banding on one edge.
  - 3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For the following:
  - 1. Composite wood products.
  - 2. Thermoset decorative panels.
  - 3. High-pressure decorative laminate.
  - 4. Adhesives.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Manufacturer of products.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets cannot be made without delaying the Work, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

### PART 2 - PRODUCTS

### 2.1 FABRICATORS

- A. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Granite Mill and Fixture Company
  - 2. Huetter Mill and Cabinet Company.
  - 3. Johnson Brothers, Inc.
  - 4. MapleLeaf Cabinets.
  - 5. Swainston Mill, Preston, ID.

## 2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
- B. Architectural Woodwork Standards Grade: Premium.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush inset.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
    - a. Abet Laminati Inc.
    - b. Formica Corporation.
    - c. Lamin-Art. Inc.
    - d. Pionite: a Panolam Industries International, Inc.brand.
    - e. Wilsonart.
- B. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.

- 2. Postformed Surfaces: Grade HGP.
- 3. Vertical Surfaces: Grade HGS.
- 4. Edges: PVC edge banding, 1/8-inch thick, matching laminate in color, pattern, and finish.
- 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels, unless indicated otherwise.
- G. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
    - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
  - 2. Drawer Sides and Backs: 1/2 inch Baltic Birch plywood.
  - Drawer Bottoms: Match sides and backs.
- H. Dust Panels: 1/4-inch plywood above compartments and drawers unless located directly under tops.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued dovetail joints.
- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated by laminate manufacturer's designations.

## 2.3 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 11 of NAAWS STANDARDS requirements for high-pressure decorative laminate countertops.
- B. Grade: Premium.
- C. High-Pressure Decorative Laminate Grade: HGS.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures similar to requiremnts for laminate casework.
- E. Edge Treatment: PVC Edging 3 MM thick minimum.
- F. Core Material: Moisture resistant MDF.

## 2.4 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.

- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Softwood Plywood: DOC PS 1, medium-density overlay.
  - 2. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
- C. Cores Cabinet Sides, Tops, Bottoms, Shelves, Doors, Drawer Fronts: Plywood cores only with surface of thermally fused, polyester decorative surfacing. "Velvet" finish where semi-exposed, plastic laminate where exposed. Particle board cores are not acceptable.
- D. Multi-Core Panel Products:
  - 1. Columbia Forest Products, "Design Edge."
  - 2. Roseburg, "SkyPly."
  - 3. Simpson, "Plyron."
  - 4. States Industries, "Armorcore."
  - 5. True North, "Multi-Core."

#### 2.5 CABINET HARDWARE AND ACCESSORIES

- A. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 120 degrees of opening, self-closing.
- B. Edge Pulls: 304 stainless steel, 4 inch long pull.
  - 1. Basis-of-Design Product: Richelieu; BP576 series.
- C. Drawer Slides: ANSI/BHMA A156.9.
  - 1. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
- D. Drawer Locks: ANSI/BHMA A156.11, E07041.
- E. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- F. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Color: As selected by Architect from manufacturer's full range of colors.
- G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
  - 1. Satin Stainless Steel: ANSI/BHMA 630.
- H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

## 2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrousmetal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

## 2.7 FABRICATION

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

# PART 3 - EXECUTION

#### 3.1 PREPARATION

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

## 3.2 INSTALLATION

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

- 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

# 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

#### SECTION 071900 – WATER REPELLENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
  - Concrete unit masonry.

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's printed statement of VOC content.
  - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
- B. Samples: For each type of water repellent and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For each type of water repellent.
- C. Sample Warranty: For special warranty.

## 1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.
- B. Mockups: Prepare mockups of each required water repellent on each type of substrate required to demonstrate aesthetic effects, and to set quality standards for materials and execution.

- Locate mockups in locations that enable viewing under same conditions as the completed Work.
  - a. Size: 10 sq. ft. each.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 FIELD CONDITIONS

- A. Limitations: Proceed with application only when the following substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
  - 1. Mortar has cured for not less than 28 days.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agree(s) to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Performance: Water repellents shall meet the following performance requirements as determined by testing on manufacturer's standard substrates representing those indicated for this Project.
- B. Water Absorption: Minimum 90 percent reduction of water absorption after 24 hours for treated compared to untreated specimens.
- C. Water-Vapor Transmission: Comply with one or both of the following:
  - 1. Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.
- D. Water Penetration and Leakage through Masonry: Minimum 90 percent reduction in leakage rate of treated compared to untreated specimens, according to ASTM E514/E514M.
- E. Durability: Maximum 5 percent loss of water-repellent performance after 2500 hours of weathering according to ASTM G154 compared to water-repellent-treated specimens before weathering.
- F. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, per ASTM D 1653.

## 2.2 WATER REPELLENTS BASIS-OF-DESIGN

A. Water Repellant/Anti-Graffiti Basis-of-Design Product: Subject to compliance with requirements, provide Prosoco Blok Guard & Graffiti Control II or a comparable product approved prior to bid.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
  - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
  - 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
  - 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Use Rilem Tube test to determine water repellency of wall prior to, and upon completion of the coating.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions and as follows:
  - 1. Concrete Unit Masonry: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents according to ASTM E1857.
- C. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.
- D. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- E. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

## 3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
  - Utilize Rilem Tube testing before and after application to establish protection provided by product application in accordance with warranty requirements as specified. Record results and report to Architect.
    - a. Unless otherwise permitted by manufacturer, testing by manufacturer's representative shall be scheduled within 24 hours after application to permit additional coats if required prior to final cure of repellent system.
    - b. Requirements for warranty shall be measured penetration in Rilem Tube test in a 20 minute period with a hydrostatic head pressure equal to 60 mph wind
- B. Apply coating of water repellent on surfaces to be treated using 15 psi- pressure spray with a fantype spray nozzle to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:
  - 1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
  - 3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Architect.
- B. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
  - 1. Notify Architect seven days in advance of the dates and times when surfaces will be tested.
  - 2. Reapply water repellent until coverage test indicates complete coverage.

# 3.5 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

## SECTION 072100 - THERMAL INSULATION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - Glass-fiber blanket.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than 200 and 450 when tested in accordance with ASTM E84.
- B. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- C. Thermal-Resistance Value (R-Value): R-19 in accordance with ASTM C518.

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## 2.2 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Kraft Faced: ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
  - Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.

#### 2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
- C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

#### PART 3 - EXECUTION

## 3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

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

THERMAL INSULATION 072100 - 2

## 3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
  - 5. For wood-framed construction, install blankets in accordance with ASTM C1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

## 3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

#### SECTION 074113.16 - STANDING SEAM METAL ROOF PANELS

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Standing-seam roof panels.
  - 2. Metal fascia and trim.
  - 3. Waterproof underlayment full coverage.

# B. Related Requirements:

- 1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.
- 2. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.
- 3. Section 076200 "Sheet Metal Flashing and Trim" for flashing and trim not part of roofing and other sheet metal work.
- 4. Section 079200 "Joint Sealants" for field-applied sealants.

## 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roofmounted equipment.
  - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
  - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
  - 5. Review structural loading limitations of deck during and after roofing.
  - 6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
  - 7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
  - 8. Review temporary protection requirements for metal panel systems during and after installation.
  - 9. Review procedures for repair of metal panels damaged after installation.
  - 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

# B. Shop Drawings:

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

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

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

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockup of typical roof eave, including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including attachments and accessories.

- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

#### 1.9 FIELD CONDITIONS

- A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish opening dimensions and proceed with fabricating roof panels without field measurements or allow for trimming panel units. Coordinate roof construction to ensure actual locations of structural members and to ensure opening dimensions correspond to established dimensions.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

## 1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

### 1.11 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

- 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  - 1. Uplift Rating: UL 90.
- E. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail Resistance: MH.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
  - Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges with evenly spaced striations between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. AEP Span; A BlueScope Steel Company.
    - b. ATAS International, Inc.
    - c. Berridge Manufacturing Company.
    - d. CENTRIA Architectural Systems.
    - e. Firestone Metal Products, LLC.
    - f. MBCI; a division of NCI Group, Inc.
    - g. Metal Sales Manufacturing Corporation.
    - h. Metal-Fab Manufacturing, LLC.
    - i. Petersen Aluminum Corporation.
  - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet

complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

- a. Roof Panel Nominal Thickness: 22 Gauge (0.0299 inch).
- b. Flashing and Trim Nominal Thickness: Manufacturer's standard material, but not less than 24 gauge (.0239 inch), or 26 gauge (.0179 inch) as applicable.
- c. Exterior Finish: Two-coat fluoropolymer.
- d. Color: As selected by Architect from manufacturer's full range.
- 3. Clips: One-piece fixed to accommodate thermal movement.
  - a. Material: 0.028-inch-nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
- 4. Joint Type: As standard with manufacturer.
- 5. Panel Coverage: 12 inches.
- 6. Panel Height: 1.5 2 inches.

### 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
  - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
  - 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
    - b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
    - c. Henry Company; Blueskin PE200 HT.
    - d. Metal-Fab Manufacturing, LLC; MetShield.
    - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and accessories required for a complete roof panel assembly and as recommended by panel manufacturer, unless otherwise indicated.
- B. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- C. Box Gutters: Formed from roof panel manufacturer's standard material and thickness, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

- D. Box Downspouts: Formed from roof panel manufacturer's standard material and thickness, Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- E. Precast Concrete Splash Blocks: Nominal 10" wide x 24" long x 3" high, precast concrete.
- F. Fasteners: Manufacturer's standard self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
  - 1. Where exposed fasteners are required, patterns must be evenly spaced, true to line into supporting framing members below.
  - 2. Provide color matched, metal-backed neoprene washers under color matched heads of exposed fasteners with bearing on weather side of panels.
  - 3. Locate and space exposed fasteners in true vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- H. Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including metal end-wall closures, trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Provide uniform colors for materials and finishes of panels as indicated.
  - 1. Continuous Ridge Vent: Roof panel manufacturer's standard perforated metal vent drip component bent shape to be located on each side of opening in wood sheathing at ridge.
  - 2. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.
  - 3. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
  - 4. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to seal joints in panel roofing and remain weathertight. Provide sealant recommended by panel manufacturer.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- J. Primer: Rust-inhibitive primer recommended by panel manufacturer for finish coat.

## 2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

## 2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
  - Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

## 3.1 EXAMINATION

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

## 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
- B. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

#### 3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm Roll laps with roller. Cover underlayment within 14 days.
  - 1. Apply over the entire roof surface.
- A. Install flashings to cover underlayment to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

## 3.4 METAL ROOF PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving metal panels.
  - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

- 3. Install screw fasteners in predrilled holes.
- 4. Locate and space fastenings in uniform vertical and horizontal alignment.
- 5. Install flashing and trim as metal panel work proceeds.
- 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
- 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
- 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

#### B. Fasteners:

- 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
  - 1. Install clips to supports with self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  - 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  - 5. Watertight Installation:
    - Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

- 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
- 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
  - 1. Terminate downspouts at splash blocks on grade with adequate clearance needed to easily remove and replace splash block.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

## 3.5 ERECTION TOLERANCES

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

#### 3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

#### 3.7 CLEANING AND PROTECTING

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

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

END OF SECTION 074113

#### SECTION 074213.13 - FORMED METAL WALL AND SOFFIT PANELS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Metal wall and soffit panels.
- 2. Weather barrier.

## B. Related Requirements:

- 1. Section 074113.16 "Standing-Seam Metal Roof Panels" for standard profile standing seam metal roof panels.
- 2. Section 076200 "Sheet Metal Flashing and Trim" for flashing and trim not part of roofing and other sheet metal work.
- 3. Section 079200 "Joint Sealants" for field-applied sealants.

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

## B. Shop Drawings:

- 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
  - 1. Include similar Samples of trim and accessories involving color selection.

- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

## 1.5 INFORMATIONAL SUBMITTALS

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

## 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockup of typical roof eave, including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including attachments and accessories.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

## 1.9 FIELD CONDITIONS

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

## 1.10 COORDINATION

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

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.

- 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft...
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

### 2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL AND SOFFIT PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall and Soffit Panels: Formed with vertical panel edges and a flat pan with a single bead between panel edges; with flush joint between panels.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following:
    - a. AEP Span; A BlueScope Steel Company.
    - b. ATAS International, Inc.
    - c. Berridge Manufacturing Company.
    - d. CENTRIA Architectural Systems.
    - e. Firestone Metal Products, LLC.
    - f. MBCI; a division of NCI Group, Inc.
    - g. Metal Sales Manufacturing Corporation.
    - h. Metal-Fab Manufacturing, LLC.
    - i. Petersen Aluminum Corporation.
  - 2. Material: Same material, finish, and color as metal roof panels.
  - 3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    - a. Nominal Thickness: Same as metal roof panels.
    - b. Flashing and Trim Nominal Thickness: Same as metal roof panels.
    - c. Exterior Finish: Two-coat fluoropolymer.
    - d. Color: As selected by Architect from manufacturer's full range.
  - 4. Panel Coverage: 12 inches.

5. Panel Height: 1.5 inch.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  - 2. Continuous Soffit Strip Vent: Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following:
    - a. Vulcan Vent VSC2120, 2" x 120", Continuous Soffit Vent, 24 gauge G90 galvanized perforated steel, with 1/8 inch diameter holes and intumescent core ember mesh, powder coated to match soffit panels.
- C. Weather Barrier: Building Wrap: ASTM E2556/E2556M, Type II air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dupont "Housewrap" or a comparable product approved prior to bid.
- D. Flashing and Trim: Provide flashing and trim formed from material indicated as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- F. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

## 2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

## 2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## C. Steel Panels and Accessories:

- 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

## **PART 3 - EXECUTION**

## 3.1 EXAMINATION

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

#### 3.2 PREPARATION

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

## 3.3 INSTALLATION OF WATER-RESISTIVE BARRIER

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
  - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansionor control-joint locations.
  - Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Wrap or Drainage Wrap: Comply with manufacturer's written instructions and warranty requirements.
  - 1. Seal seams, edges, fasteners, and penetrations with tape.
  - 2. Extend into jambs of openings and seal corners with tape.

## 3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated.

Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

- 1. Shim or otherwise plumb substrates receiving metal panels.
- 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
- 3. Install screw fasteners in predrilled holes.
- 4. Locate and space fastenings in uniform vertical and horizontal alignment.
- 5. Install flashing and trim as metal panel work proceeds.
- 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
- 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

#### B. Fasteners:

- 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
  - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

# E. Watertight Installation:

- 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
- 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, strip vents and similar items. Provide types indicated, indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
  - 2. Center continuous strip vent in low eave horizontal soffits. Provide J shaped metal trim for termination of soffit panel at each side of strip vent.

- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
  - 1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

## 3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 074213.13** 

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

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

- 1. Manufactured reglets with counterflashing.
- 2. Formed roof-drainage sheet metal fabrications.
- 3. Formed roof sheet metal fabrications.
- 4. Formed wall sheet metal fabrications.

## B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
- 2. Section 042200 "Concrete Unit Masonry" for materials and installation of manufactured sheet metal through-wall flashing and trim integral with masonry.
- 3. Section 074113.16 "Standing Seam Metal Roof Panels" for installation of sheet metal flashing and trim integral with roofing.

## 1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 6. Include details of termination points and assemblies.

- 7. Include details of roof-penetration flashing.
- 8. Include details of edge conditions, including eaves, ridges, rakes, flashings, and counterflashings.
- 9. Include details of special conditions.
- 10. Include details of connections to adjoining work.
- 11. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- E. Sample Warranty: For special warranty.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

### 1.7 QUALITY ASSURANCE

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

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
  - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
  - 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

## 1.9 WARRANTY

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

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
  - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A755/A755M.
  - 1. Surface: Smooth, flat.

- 2. Exposed Coil-Coated Finish:
  - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 3. Color: Match metal roof panels.
- 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

## 2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- F. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- G. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

## 2.4 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
  - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
  - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

#### B. Fabrication Tolerances:

- 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

# G. Seams:

- 1. Fabricate nonmoving seams with flat-lock seams.
- H. Do not use graphite pencils to mark metal surfaces.

## 2.5 ROOF-DRAINAGE SHEET METAL FABRICATIONS

## A. Hanging Gutters:

- 1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
- 2. Fabricate in minimum 96-inch- long sections.
- 3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.

- 4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
- 5. Gutter Profile: As indicated at Section 074113.16 "Standing Seam Metal Roof Panels".
- 6. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
  - a. Galvanized Steel: 0.0179 inch thick.
- B. Downspouts: Fabricate downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.
  - 1. Hanger Style: As indicated on Drawings.
  - 2. Fabricate from the following materials:
    - a. Galvanized Steel: 0.0179 inch thick.

## 2.6 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Drip Edges: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.0179 inch thick.
- B. Eave, Rake and Ridge Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.0179 inch thick.
- C. Counterflashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.0179 inch thick.
- D. Flashing Receivers: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.0179 inch thick.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
  - 1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds and sealant.
  - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
  - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  - 8. Do not field cut sheet metal flashing and trim by torch.
  - 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
  - 1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
  - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  - 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
  - 1. Use sealant-filled joints unless otherwise indicated.
    - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
    - b. Form joints to completely conceal sealant.
    - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

- d. Adjust setting proportionately for installation at higher ambient temperatures.
  - 1) Do not install sealant-type joints at temperatures below 40 deg F.
- 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

#### 3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

## B. Hanging Gutters:

- 1. Join sections with riveted and soldered joints or joints sealed with sealant.
- 2. Provide for thermal expansion.
- 3. Attach gutters at eave or fascia to firmly anchor them in position.
- 4. Provide end closures and seal watertight with sealant.
- 5. Slope to downspouts.
- 6. Fasten gutter spacers to front and back of gutter.
- 7. Anchor back of gutter that extends onto roof deck with continuous cleat or cleats spaced not more than 24 inches apart.
- 8. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.

## C. Downspouts:

- 1. Join sections with 1-1/2-inch telescoping joints.
- 2. Provide hangers with fasteners designed to hold downspouts securely to walls.
- 3. Locate hangers at top and bottom and at approximately 60 inches o.c.
- 4. Provide elbows at base of downspout to direct water away from building.

## 3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard.
  - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

#### B. Roof Edge Flashing:

- 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
- 2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
  - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  - 2. Extend counterflashing 4 inches over base flashing.
  - 3. Lap counterflashing joints minimum of 4 inches.
  - 4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

## 3.5 INSTALLATION TOLERANCES

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

## 3.6 CLEANING

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

## 3.7 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

#### SECTION 077253 - SNOW GUARDS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Rail-type, seam-mounted snow guards.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
  - 1. Include details of rail-type snow guards.
- C. Samples:
  - 1. Rail-Type Snow Guards: Bracket and 12-inch- long rail.
    - a. For units with factory-applied finishes, submit specified color.
- D. Delegated-Design Submittal: For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Include calculation of number and location of snow guards.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that the engineer is licensed in the state in which the Project is located.
- B. Product Test Reports: For each type of snow guard, for tests performed by a qualified testing agency, indicating point of failure of attachment to roof system identical as that used on this Project.

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## 1.5 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit adhesive-mounted snow guards to be installed according to adhesive manufacturer's written instructions.

## PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design snow guards, including attachment to building, based on the following:
  - Roof snow load.
  - 2. Snow drifting
  - Roof slope.
  - 4. Roof type.
  - 5. Roof dimensions.
  - 6. Roofing substrate type and thickness.
  - 7. Snow guard type.
  - 8. Snow guard fastening method and strength.
  - 9. Snow guard spacing.
  - 10. Coefficient of Friction Between Snow and Roof Surface: 0.
  - 11. Factor of Safety: 2.
- B. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- C. Structural Performance: Snow guards shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
  - 1. Snow Loads: As indicated on Drawings.

# 2.2 RAIL-TYPE SNOW GUARDS

- A. Seam-Mounted, Rail-Type Snow Guards:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.
    - b. LMCurbs.
    - c. TRA SNOW AND SUN, INC.
  - 2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with two rails.
  - 3. Material and Finish: Steel, with powder coat to match roof panels.

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4. Seam Clamps: ASTM B221 aluminum extrusion or ASTM B 85/B 85M aluminum casting with stainless-steel set screws incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.
  - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean and prepare substrates for bonding snow guards.
- B. Prime substrates according to snow guard manufacturer's written instructions.

## 3.3 INSTALLATION

- A. Install snow guards according to manufacturer's written instructions.
  - 1. Space rows as indicated on Shop Drawings.
- B. Attachment for Standing-Seam Metal Roofing:
  - 1. Do not use fasteners that will penetrate metal roofing or fastening methods that void metal roofing finish warranty.
  - 2. Seam-Mounted, Rail-Type Snow Guards:
    - a. Install brackets to vertical ribs in straight rows.
    - b. Secure with stainless-steel set screws, incorporating round nonpenetrating point, on same side of standing seam.
    - c. Torque set screw according to manufacturer's instructions.
    - d. Install cross members to brackets.

## END OF SECTION 077253

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#### SECTION 079200 - JOINT SEALANTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Nonstaining silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Butyl joint sealants.
  - 4. Latex joint sealants.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

- Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- E. Field-Adhesion-Test Reports: For each sealant application tested.
- F. Sample Warranties: For special warranties.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

## 1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

# 1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

- 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
- 2. Disintegration of joint substrates from causes exceeding design specifications.
- 3. Mechanical damage caused by individuals, tools, or other outside agents.
- 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

# PART 2 - PRODUCTS

# 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
  - 1. Architectural sealants shall have a VOC content of 250 g/L or less.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

#### 2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Corning Corporation; 790.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.; Silpruf SCS2700.
    - c. Pecora Corporation; 890.
    - d. Tremco Incorporated; Spectrem 1.

## 2.3 URETHANE JOINT SEALANTS

- A. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bostik, Inc.; Chem-Calk 555-SL.
    - b. Pecora Corporation; Dynatrol II SG Urexpan NR 200
    - c. Sherwin-Williams Company (The); Stampede-2SL.
    - d. Tremco Incorporated; THC 900/901.

## 2.4 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bostik, Inc.; Chem-Calk 300.
    - b. Pecora Corporation; BC-158.

## 2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Construction Chemicals Building Systems; Sonolac.
    - b. Pecora Corporation; AC-20.
    - c. Tremco Incorporated; Tremflex 834.

## 2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Construction Chemicals Building Systems.
    - b. Construction Foam Products, a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
    - d. Exterior insulation and finish systems.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

## 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

## 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed and cured sealant joints as follows:
    - Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

- 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
  - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
- 3. Inspect tested joints and report on the following:
  - a. Whether sealants filled joint cavities and are free of voids.
  - b. Whether sealant dimensions and configurations comply with specified requirements.
  - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
- 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
- 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

## 3.5 CLEANING

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

## 3.6 PROTECTION

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

## 3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
  - 1. Joint Locations:

- a. Isolation and contraction joints in cast-in-place concrete slabs.
- 2. Joint Sealant: Urethane, M, P, 25, T, NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Building standard unless noted otherwise.
  - 2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Concealed mastics.
  - 1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Butyl-rubber based.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

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

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section includes:
  - 1. Exterior standard steel doors and frames.
- B. Related Requirements:
  - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

#### 1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

#### 1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

## 1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

#### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
  - Elevations of each door type.

- 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
- 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- 4. Locations of reinforcement and preparations for hardware.
- 5. Details of each different wall opening condition.
- 6. Details of anchorages, joints, field splices, and connections.
- 7. Details of accessories.

## C. Samples for Verification:

- 1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
- 2. Fabrication: Prepare Samples approximately 8 by 10 inches to demonstrate compliance with requirements for quality of materials and construction:
  - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
  - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
  - 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
  - 2. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.
- C. Field quality control reports.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
  - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - Ceco Door: ASSA ABLOY.
  - 2. Curries Company; ASSA ABLOY.
  - 3. Premier Products, Inc.
  - 4. Republic Doors and Frames.
  - 5. Steelcraft; an Allegion brand.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

#### 2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

# 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
- d. Edge Construction: Model 1, Full Flush or Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Manufacturer's standard.
- i. Fire-Rated Core: Manufacturer's standard vertical steel stiffener with insulation core for fire-rated doors.

## 2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
- b. Construction: Full profile welded.

3. Exposed Finish: Prime.

#### 2.4 FRAME ANCHORS

## A. Jamb Anchors:

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

## 2.5 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

## 2.6 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
  - Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- D. Plaster Guards in Frames: Provide minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

#### 2.7 STEEL FINISHES

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

## PART 3 - EXECUTION

## 3.1 PREPARATION

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

## 3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  - 2. Floor Anchors: Secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  - 3. Solidly pack mineral-fiber insulation inside frames.
  - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
  - 5. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

## 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

## 3.4 REPAIR

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

END OF SECTION 081113

#### SECTION 083313 - COILING COUNTER DOORS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - Counter door assemblies.
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for door-opening framing and corner guards.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
  - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
  - 3. Include description of automatic closing device and testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 4. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
  - 5. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
  - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
  - 1. Curtain slats.

- 2. Bottom bar.
- 3. Guides.
- Brackets.
- 5. Hood.
- 6. Locking device(s).
- 7. Include similar Samples of accessories involving color selection.

## 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.
  - 1. Obtain operators and controls from coiling counter door manufacturer.

#### 2.2 COUNTER DOOR ASSEMBLY

- A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Alpine Overhead Doors, Inc.
    - b. Cookson Company.
    - c. Cornell.
    - d. McKeon Rolling Steel Door Company, Inc.
    - e. Overhead Door Corporation.
    - f. Raynor.
    - g. Wayne-Dalton Corp.
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Curtain R-Value: 4.5 deg F x h x sq. ft./Btu at exterior doors only.

- D. Door Curtain Material: Stainless steel.
- E. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.
  - 1. Insulated-Slat Interior Facing: Metal.
  - 2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- F. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated stainless steel and finished to match door.
- G. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- H. Hood: Match curtain material and finish.
  - 1. Shape: Square.
  - 2. Mounting: As indicated on Drawings.
- I. Integral Frame, Hood, and Fascia: Stainless steel.
  - 1. Mounting: As indicated on Drawings.
- J. Sill Configuration: Integral metal sill.
- K. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with thumbturn outside with cylinder.
- L. Electric Door Operator:
  - 1. Usage Classification: Medium duty, up to 12 cycles per hour and up to 50 cycles per day.
  - 2. Operator Location: As indicated.
  - 3. Motor Exposure: Interior.
  - Motor Electrical Characteristics:
    - a. Horsepower: 1/2 hp.
    - b. Voltage:
      - 1) 115-V ac, single phase, 60 Hz.
  - 5. Emergency Manual Operation: Crank type.
  - 6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
  - 7. Control Station(s): Interior-side mounted.
- M. Door Finish:
  - 1. Stainless Steel Finish: ASTM A480/A480M No. 4 (polished directional satin).
  - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.
- 2.3 MATERIALS, GENERAL
  - A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.4 DOOR CURTAIN MATERIALS AND FABRICATION

- A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
  - 1. Stainless Steel Door Curtain Slats: ASTM A240/A240M or ASTM A666, Type 304; sheet thickness of 0.025 inch; and as required.
  - 2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
  - 3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
  - 1. Removable Posts and Jamb Guides: Manufacturer's standard.

## 2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
  - 1. Stainless Steel: 0.025-inch- thick, stainless steel sheet, Type 304, complying with ASTM A240/A240M or ASTM A666.
- B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):
  - 1. Stainless Steel: Type 304, complying with ASTM A240/A240M or ASTM A666.

#### 2.6 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
  - 1. Lock Cylinders: As specified in Section 087100 "Door Hardware".
  - 2. Keys: Three for each cylinder.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

# 2.7 CURTAIN ACCESSORIES

A. Weatherseals: Equip door with weather-stripping gaskets fitted to entire perimeter of door for airresistant installation unless otherwise indicated.

- At door head, use 1/8-inch- thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
- 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.
- B. Pole Hooks: Provide pole hooks and poles for doors more than 84 inches high.

## 2.8 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

#### 2.9 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
  - 1. Comply with NFPA 70.
  - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Operator location indicated for each door.
  - Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
  - 2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
  - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
  - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
  - 3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
  - 1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
    - a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
  - 1. Type: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

## 2.10 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.11 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 1. Run grain of directional finishes with long dimension of each piece.
  - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - 3. Directional Satin Finish: ASTM A480/A480M No. 4.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION, GENERAL

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

## 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and to furnish reports to Architect.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - Test door release, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of closed door. Reset door-closing mechanism after successful test.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

# 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
  - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

## 3.5 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

## 3.6 DEMONSTRATION

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

END OF SECTION 083313

#### SECTION 085113 - ALUMINUM WINDOWS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

A. Section includes aluminum windows for exterior locations.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: For aluminum windows.
  - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Samples for Initial Selection: For units with factory-applied finishes.
  - 1. Include Samples of hardware and accessories involving color selection.
- E. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
  - 1. Exposed Finishes: 2 by 4 inches.
  - 2. Exposed Hardware: Full-size units.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Sample Warranties: For manufacturer's warranties.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

#### 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of materials and finishes beyond normal weathering.
    - e. Failure of insulating glass.
  - 2. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Aluminum Finish: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

## 2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
  - 1. Window Certification: AAMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
  - 1. Minimum Performance Class: CW.
  - 2. Minimum Performance Grade: 30.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.45 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40.

- E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

#### 2.3 ALUMINUM WINDOWS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. All Seasons Window & Door Mfg.; All Seasons Commercial Division, Inc.
  - 2. Arcadia, Inc.
  - 3. EFCO Corporation.
  - 4. Graham Architectural Products Corporation.
  - 5. Kawneer North America, an Arconic company.
- B. Types: Provide the following types in locations indicated on Drawings:
  - 1. Horizontal sliding with fixed center panel.
- C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
  - 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- D. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
  - 1. Kind: Fully tempered.
- E. Insulating-Glass Units: ASTM E2190.
  - 1. Glass: ASTM C1036, Type 1, Class 1, q3.
    - a. Tint: Clear.
    - b. Kind: Fully tempered.
  - 2. Lites: Three.
  - 3. Filling: Fill space between glass lites with air.
  - 4. Low-E Coating: Sputtered on second surface.
- F. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- G. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material

compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

## H. Horizontal-Sliding Window Hardware:

- 1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
- 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- 3. Roller Assemblies: Low-friction design.
- I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
  - 1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

#### 2.4 ACCESSORIES

- A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.
- B. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- C. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.
- D. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

# 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

# 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Windows will be considered defective if they do not pass tests and inspections.

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# 3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

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#### SECTION 087100 - DOOR HARDWARE

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Commercial door hardware for the following:
    - a. Swinging doors.
- B. Related Sections include the following:
  - Division 08 Section "Hollow Metal Doors and Frames"

#### 1.3 REFERENCED STANDARDS

- A. Provide hardware in accordance with the following standards in addition to those specified in Division 01 Section "References".
  - 1. American National Standards Institute (ANSI), A117.1: Accessible and Usable Buildings and Facilities, edition as adopted by local Authority Having Jurisdiction (AHJ).
  - 2. Builders Hardware Manufacturer's Association (BHMA)
    - a. ANSI/BHMA A156.2: Bored and Preassembled Locks and Latches, 2011 edition
    - b. ANSI/BHMA A156.3: Exit Devices, 2008 edition
    - c. ANSI/BHMA A156.4: Door Controls Closers, 2008 edition
    - d. ANSI/BHMA A156.18: Materials and Finishes, 2006 edition
    - e. ANSI/BHMA A156.19: Power Assist and Low Energy Power Operated Doors, 2007 edition
  - 3. Door and Hardware Institute (DHI)
    - a. Recommended Locations for Architectural Hardware for Flush Wood Doors, 1993 edition
    - b. Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames, 2004 edition
    - c. Installation Guide for Doors and Hardware, 1994 edition
    - d. Keying Systems and Nomenclature, 2003 edition
    - e. Seguence and Format for the Hardware Schedule, 2001 edition

## 1.4 ACTION SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets, if requested.
  - 1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Qualification Data: For Installer
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, and closers as requested.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- F. Warranty: Special warranty specified in this Section.
- G. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
  - 2. Content: Include the following information:
    - a. Identification number, location, hand, fire rating, and material of each door and
    - b. Type, style, function, size, quantity, and finish of each door hardware item.
    - Complete designations of every item required for each door or opening including name and manufacturer.
    - d. Fastenings and other pertinent information.
    - e. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - f. Explanation of abbreviations, symbols, and codes contained in schedule.
    - g. Mounting locations for door hardware.
    - h. Door and frame sizes and materials.
    - i. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
      - Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
    - j. List of related door devices specified in other Sections for each door and frame.
  - 3. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples,

Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
  - 1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  - 2. Installer shall have warehousing facilities in Project's vicinity.
  - 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  - 4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
  - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2. Preliminary key system schematic diagram.
  - 3. Requirements for key control system.
  - 4. Address for delivery of keys.
- E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

## 1.7 COORDINATION

A. Coordinate layout and installation of recessed hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of operators and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  - 2. Warranty Period: Three (3) years from date of Substantial Completion, except as follows:
    - a. Continuous Hinges: Lifetime of Building
    - b. Grade 1 Cylindrical Locks: Ten (10) years from date of Substantial Completion.
    - c. Exit Devices: Three (3) years from date of Substantial Completion.
    - d. Manual Closers: Thirty (30) years from date of Substantial Completion.
    - e. Automatic Operators: Two (2) years from date of Substantial Completion.

## 1.9 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

Maintenance Service: Beginning at Substantial Completion, provide six (6) months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

Hinges: Ives
 Continuous Hinges: Ives
 Operating Door Trim: Ives
 Decorative Door Pulls: Ives

5. Not used.

6. Locks and Latches: Schlage, Owner's Standard7. Cylinders and Cores: Schlage FSIC 0 bitted

8. Not Used

9. Mechanical Door Closers: LCN, Owner's Standard

10. Not used.

11. Accessories and Trim: Ives
12. Saddle Thresholds: Zero
13. Weather Strip and Gasket: Zero
14. Not used .

15. Not used

16. Miscellaneous Hardware: Ives

## 2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Provide either the product designated or a comparable product of another manufacturer that complies with requirements, approved prior to bid.

#### 2.3 MATERIALS AND FABRICATION

#### A. General

- 1. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
  - a. Manufacturer's identification will be permitted on rim of lock cylinders only.
- 2. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.
- 3. Provide hardware manufactured to conform to published templates generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

## B. Fasteners

- Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Furnish stainless steel (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- 2. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Use through bolts only as indicated in this section unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thrubolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

# 2.4 CONTINUOUS HINGES

A. Requirements:

 Geared Continuous Hinges: Shall utilize a single gear section for the door leaf and a separate gear section for the frame side of the door. Provide full mortise or surface applied hinge as scheduled in each set. Geared hinges are to be UL 10C tested and approved for 90 minutes.

#### 2.5 OPERATING DOOR TRIM

#### A. Door Bolts

# 1. Requirements:

- a. Provide bolt model recommended by manufacturer for door material type.
- b. Provide 1 inch throw stainless steel bolt with 12 inch length unless otherwise scheduled in the sets.
- Provide a dust proof strike for bottom bolt at all locations where there is not a threshold.

#### B. Coordinators

# 1. Requirements:

- Provide bar type coordinator and filler bar of size as recommended by manufacturer for each opening.
- b. Provide mounting brackets as required for soffit mounted hardware to be compatible with coordinator.

## C. Push Plates, Pull Plates, and Pulls

# 1. Requirements:

- a. Push Plate: Provide 6 inch by 16 inch by .050 inch push plate constructed of stainless steel. Bevel all four edges.
- b. Pull Plate: Provide 4 inch by 16 inch by .050 inch push plate constructed of stainless steel, bevel all four edges. Provide 10 inch center to center (CTC) pull constructed of stainless steel with a diameter of 1 inch.

## 2.6 LOCKS AND LATCHES

#### A. General:

- 1. Lock Chassis: Shall be made from steel, with locking spindles of stainless steel.
- 2. Latch Bolt: Shall be constructed of stainless steel with 3/4 inch throw on mortise locks and 1/2 inch throw otherwise. Latch to be deadlocking on keyed functions.
- 3. Lever Trim: Shall be pressure cast brass, bronze, zinc, or steel with wrought rose design. Levers are to be solid with no voids or plastic inserts.
- 4. Fire Rating: Lock shall be listed for up to 3 hours.
- 5. Strike Plates: Provide ANSI 4-7/8 inch strike plates. At pairs of doors, provide strike with 7/8 inch flat lip. At single doors, provide round-lipped strike with lip length as required to minimally clear jamb and trim. Provide dust box at each strike location.

## B. Grade 1 Bored Locks

- 1. Basis-of-Design: Provide Basis-of-Design product indicated in Part 3 Hardware Schedule, or a comparable product by another manufacturer approved prior to bid.
- 2. Requirements:

- a. ANSI Grade: BHMA/ANSI A156.2, Series 4000, Grade 1.
- b. Door Prep: Provide lockset to install using a standard ANSI 161 door preparation.
- c. Anti-Rotation Plate: Provide lockset with a mechanically interlocked anti-rotation plate. Anti-Rotation teeth or "bite tabs" are not acceptable. Locks without any rotation prevention devices are not acceptable.
- d. Lever Return Springs: Provide each lever with two compression type return springs that are easily accessible without dismantling the lock chassis. Locks utilizing tension or torsion lever return springs are unacceptable. Locks with internal springs that require dismantling the lock chassis are unacceptable.
- e. Lever Spindles: Provide lock with either milled or 1-piece deep drawn spindles. 2-piece interlocking stamped spindles are not acceptable.
- f. Multi-Functionality: Provide modular lockset with capability to convert to a new lock function by changing key cams.
- g. Vandal Resistant Lever: Where scheduled, provide lockset with lever that freely rotates even when locked to resist vandalism and abuse.

#### 2.7 CYLINDERS AND CORES

## A. Requirements:

- 1. Full Size Interchangeable Cylinders: Provide cylinders of quantity and type and with the appropriate cam/tailpiece to be compatible with the locking hardware provided. Provide cylinder housings ready to accept 6-pin, Full-Size Interchangeable Cores (FSIC).
  - a. Temporary Construction Keying: Provide each cylinder housing and/or lock lever with keyed construction core during the construction period. Cores will remain property of the contractor and will be returned upon installation of owner's permanent key system.
  - b. Permanent Cores: Provide 0-bitted cores. Verify keyway with Owner before ordering locks and cylinder cores. Ship cores directly to owner's representative.
- 2. Keys: Provide cylinder manufacturer's standard keys. Keys shall be shipped separate from cores directly to owner's representative. For estimating purposes, provide keys in the following quantities:

a. Construction Control Keys:
b. Construction Change Keys:
c. Permanent Control Keys:
d. Permanent Change Key Blanks:
2 each
2 each
4 per core

# 2.8 MECHANICAL DOOR CLOSERS

## A. General:

- 1. Valves: Closers shall have separate valves for latch speed, main speed, and back check. Valves shall be staked to prevent accidental removal.
- 2. Provide the appropriate closer body, handing, and brackets to mount closer inside the building on the least-public side of the door.
  - a. Where closers are to be mounted parallel arm, provide with heavy duty, fully forged arms.
  - b. Where closers are to be mounted regular arm and the opening can otherwise be opened to 180 degrees, provide closer with the appropriate special templating to

allow 180 degree door swing. Where a special template is not available for 180 degree swing, provide closer arm with integrated stop.

- 3. Integrated Stop Closer Arms: Where a closer with integrated stop is required, provide the appropriate closer and arm as follows:
  - a. Parallel arm with spring-cushioned stop arm: Provide where door is otherwise able to open to 95 degrees and requires a parallel arm mount closer.
  - b. Parallel arm with dead stop arm: Provide where door is obstructed from opening to 95 degrees and requires a parallel arm mount closer.
  - c. Regular arm with push side surface-mounted overhead stop: Provide where door closer should mount on pull side of door.
- 4. Closers are to be handed and sized specific to application with metal covers.
- 5. Hold Open Arms: Provide closer arms with mechanical hold-opens as scheduled.
- 6. Provide closers with any special templates, brackets, plates, or other accessories required for interface with header, door, wall, and other hardware. Provide closers with screw packs containing thru-bolts, machine screws, and wood screws.
- 7. Closers shall be provided with all-weather fluid and shall not require readjustment from 120 degrees F to -30 degrees F. Fluid shall be non-flaming and shall not fuel door or floor covering fires. Upon request, provide data indicating thermal properties of fluid.
- 8. Closers shall close and latch door when adjusted to meet accessibility requirements for door opening force: 8.5 lbs at exterior doors, 5 lbs at interior doors, and 15 lbs at labeled fire doors.
- B. Heavy Duty Door Closers:
  - 1. Acceptable Products:

a. LCN: 4011/4111

- 2. Requirements:
  - a. ANSI Grade: BHMA/ANSI A156.4. Grade 1.
  - b. Closer Construction: Closer shall have cast iron body with 1-1/2 inch steel piston, double heat treated pinion, 5/8 inch bearing journals, and full complement needle or caged ball bearings. Closer shall be adjustable from sizes 1 through 6.
  - c. Provide closers with spring size adjustment dial for ease of adjusting.
- C. Closer Release Devices
  - 1. Acceptable Products:

a. ABH: 2000 Series

- D. Requirements:
  - 1. Provide 400 pound electro-magnetic hold open device constructed of die cast metal. Electromagnet shall accept 120VAC, 24VDC, and/or 12VDC power from fire alarm. Provide mounting style as scheduled.

## 2.9 ARCHITECTURAL DOOR TRIM

- A. Protection Plates and Edge Guards
  - 1. Requirements:

- a. Provide .050 inch thick stainless steel protection plates with height as scheduled. Plate shall have four beveled edges and countersunk screws. Provide plate with width as follows:
  - 1) Pairs of Doors: Provide plate to be 1 inch less door width.
  - 2) Single Doors: Provide plate to be 2 inches less door width on push side, pull side mounted plates to be 1 inch less door width.

## B. Door Stops and Holders

# 1. Requirements:

- a. Provide stops and holders as indicated in the HW sets.
- b. Where wall bumpers are scheduled, provide concave rubber bumper where the adjacent lever trim incorporates a push-button. Otherwise, provide convex rubber bumpers.

## 2.10 SADDLE THRESHOLDS

# A. Requirements:

- 1. Saddle thresholds: Provide with length equal to the width of the opening.
- 2. Panic thresholds: Provide with length equal to the overall frame width. Provide with mitered and welded ends.
- 3. Provide stainless steel machine screws and lead anchors for each threshold.

#### 2.11 WEATHERSTRIP AND GASKET

## A. General:

- 1. Provide weather strip and gasketing as scheduled.
- 2. Size weather strip and gasket to provide a continuous seal around opening and at meeting stiles.

# B. Perimeter Seals

# C. Astragals, Meeting Stiles, and Mullion Seals

## 1. Requirements

- a. Where overlapping astragals are scheduled on exterior doors, provide with thrubolts.
- b. Where overlapping astragals are scheduled on out-swinging doors, provide for mounting on the pull-side of the active leaf. Otherwise, provide for mounting on the push-side of the inactive leaf.

## D. Sweep

# 1. Requirements

a. Rain Drip Door Sweep w/ Nylon Brush.

# 2.12 MISCELLANEOUS HARDWARE

A. Silencers

# 1. Requirements:

- a. Where indicated on single openings, provide 3 each rubber silencers on lock jamb.
- b. Where indicated on paired openings, provide 2 each rubber silencers on header.

#### 2.13 FINISHES

- A. Match items to the manufacturer's standard color and texture finish for the latch and locksets (or push-pull units if no latch or locksets).
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
- D. The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.
  - 1. Brushed Chrome and/or Stainless Steel Appearance
    - Brushed Stainless Steel, no coating: ANSI 630.
    - b. Satin Chrome, Clear Coated: ANSI 626, ANSI 652.
    - c. Powder Coated Aluminum finish: ANSI 689.
    - d. Saddle and Panic Thresholds: Mill Aluminum finish.
    - e. Weatherstrip and Gasket: Clear Anodized Aluminum finish.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
  - Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

## 3.3 INSTALLATION

- A. Pre-installation conference shall be conducted prior to installation of hardware at Project site. Meet with the Owner, Contractor, installer, and manufacturer's representatives. Review catalogs, brochures, templates, installation instructions, and the approved hardware schedule. Survey installation procedures and workmanship, with special emphasis on unusual conditions, as to ensure correct technique of installation, and coordination with other work. Notify participants at least ten, 10 working days before conference.
- B. Hardware Installers must have a minimum of five (5) years' experience in installation of hardware. Provide verification of installer's qualification to Consultant for approval. All installers to attend review meetings with the hardware distributor.
- C. Install hardware using only manufacturer supplied and approved fasteners in strict adherence with manufacturers published installation instructions.
- D. Install head seal prior to installation of "PA" parallel arm mounted door closers and push side mounted door stops/holders. Trim, cut and notch thresholds and saddles neatly to minimally fit the profile of the door frame. Install thresholds and saddles in a bed of caulking completely sealing the underside from water and air penetration.
- E. Counter sink through bolt of door pull under push plate during installation.
- F. Mounting Heights: Mount door hardware units at heights indicated, as follows, unless otherwise indicated or required to comply with governing regulations.
  - Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
- G. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- H. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

## 3.4 FIELD QUALITY CONTROL

- A. Architect or Architectural Hardware Consultant shall perform inspections and prepare inspection reports.
- B. Architect or Architectural Hardware Consultant shall inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

## 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

## 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

#### 3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

# 3.8 DOOR HARDWARE SETS

- A. The following schedule of hardware sets shall be considered a guide and the supplier is cautioned to refer to general conditions, special conditions, and the full requirements of this section. It shall be the hardware supplier's responsibility to furnish all required hardware. Scheduled door hardware is not limited to the specific door numbers indicated.
- B. Where items of hardware are not definitely or correctly specified and are required for completion of the Work, a written statement of such omission, error, conflict, or other discrepancy shall be sent to the Architect, prior to date specified for receipt of bids, for clarification by addendum.
- C. Adjustments to the Contract Sum will not be allowed for omissions or items of hardware not clarified prior to bid opening.

# HW SET NO: 01 DOOR NUMBER:

A101

CONT. HINGE	224HD	628	IVE
CONST LATCHING	FB51P	630	IVE
BOLT			
DUST PROOF STRIKE	DP2	626	IVE
STOREROOM LOCK	ND96TD RHO	626	SCH
	CONST LATCHING BOLT DUST PROOF STRIKE	CONST LATCHING FB51P BOLT DUST PROOF STRIKE DP2	CONST LATCHING FB51P 630 BOLT DUST PROOF STRIKE DP2 626

1 EA	FSIC PERMANENT CORE 0 BITTED	23-030	626	SCH
2 EA	(VERIFY KEYWAY) COORDINATOR MOUNTING BRACKET SURFACE CLOSER CUSH SHOE SUPPORT	COR X FL MB 4111 AVB SHCUSH MC TBWMS 4110-30	628 689 689 689	IVE IVE LCN LCN
1 EA	SEAL	429A (DO NOT NOTCH AROUND CLOSER BRACKETS)	AL	ZER
2 EA	SECURITY ASTRAGAL DOOR SWEEP THRESHOLD	43SP 39A 655A MSLA-10	600 AL AL	ZER ZER ZER
HW SET DOOR NI A104				
1 EA	CONT. HINGE STOREROOM LOCK FSIC PERMANENT CORE 0 BITTED (VERIFY KEYWAY)	224HD ND96TD RHO 23-030	628 626 626	IVE SCH SCH
	SURFACE CLOSER CUSH SHOE SUPPORT	4111 AVB SHCUSH MC TBWMS 4110-30	689 689	LCN LCN
1 EA 1 EA 1 EA	SEAL DOOR SWEEP THRESHOLD RAIN DRIP WALL BUMPER	429A 8198AA 655A MSLA-10 142A WS401 / 402	AL AL AL A 630	ZER ZER ZER ZER IVE
HW SET DOOR NU A105				
1 EA 1 EA 1 EA	CONT. HINGE CLASSROOM LOCK FSIC PERMANENT CORE 0 BITTED	224HD ND94TD RHO 23-030	628 626 626	IVE SCH SCH
1 EA 1 EA	(VERIFY KEYWAY) SURFACE CLOSER CUSH SHOE SUPPORT	4111 AVB SHCUSH MC TBWMS 4110-30	689 689	LCN LCN
	SEAL DOOR SWEEP	429A 8198AA 655A MSLA-10 142A WS401 / 402	AL AL AL A 630	ZER ZER ZER ZER IVE

HW SET NO: 04 DOOR NUMBER:

A202

Ogden So	en School District Construction Documents - 18 August 202			
1 EA	CONT. HINGE STOREROOM LOCK FSIC PERMANENT CORE 0 BITTED (VERIFY KEYWAY)	224HD ND96TD RHO 23-030	628 626 626	IVE SCH SCH
	SURFACE CLOSER CUSH SHOE SUPPORT	4111 AVB SHCUSH MC TBWMS 4110-30	689 689	LCN LCN
	SILENCERS WALL BUMPER	WS401 / 402	630	IVE
HW SET DOOR NO A103				
1 EA	CONT. HINGE STOREROOM LOCK FSIC PERMANENT CORE 0 BITTED (VERIFY KEYWAY)	224HD ND96TD RHO 23-030	628 626 626	IVE SCH SCH
	SURFACE CLOSER CUSH SHOE SUPPORT	4111 AVB SHCUSH MC TBWMS 4110-30	689 689	LCN LCN
1 EA 1 EA	SEAL DOOR SWEEP THRESHOLD RAIN DRIP	429A 8198AA 655A MSLA-10 142A	AL AL AL A	ZER ZER ZER ZER
HW SET DOOR NO A102				
	CONT. HINGE CLASSROOM LOCK FSIC PERMANENT CORE 0 BITTED (VERIFY KEYWAY)	224HD ND94TD RHO 23-030	628 626 626	IVE SCH SCH
1 EA 1 EA	SURFACE CLOSER CUSH SHOE SUPPORT	4111 AVB SHCUSH MC TBWMS 4110-30	689 689	LCN LCN
1 EA 1 EA 1 EA 1 EA	SEAL DOOR SWEEP THRESHOLD RAIN DRIP	429A 8198AA 655A MSLA-10 142A	AL AL AL A	ZER ZER ZER ZER

# **END OF SECTION**

#### SECTION 092900 - GYPSUM BOARD

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Gypsum board, Type X.
  - 2. Interior trim.
  - 3. Joint treatment materials.
- B. Samples for Verification: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

# 1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

## 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

## 2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

# 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Gypsum.
    - b. CertainTeed Corporation.
    - c. National Gypsum Company.
    - d. USG Corporation.
  - 2. Thickness: 5/8 inch.
  - 3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- B. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

# 2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
  - 2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - e. Expansion (control) joint.

# 2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:

- 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

#### 2.6 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

#### 3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Type X: As indicated on Drawings.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
  - On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  - 2. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members
  - 3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

## 3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. LC-Bead: Use at exposed panel edges.
  - 3. L-Bead: Use where edge trim can only be installed after gypsum panels are installed.
  - 4. U-Bead: Use where indicated.

#### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

#### 3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other nondrywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

#### SECTION 096513 - RESILIENT BASE AND ACCESSORIES

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

# A. Section Includes:

- 1. Thermoset-rubber base.
- 2. Rubber stair accessories.
- 3. Rubber molding accessories.
- B. Base, accessories and adhesives specified in this Section are provided by Owner, installed by Contractor.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

# 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

## 1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

#### PART 2 - PRODUCTS

# 2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
  - 2. Johnsonite; A Tarkett Company.
  - 3. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  - 1. Style and Location:
    - a. Style A, Straight: In locations indicated or as directed by Architect.
    - b. Style B, Coved: In locations indicated or as directed by Architect.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed.
- H. Colors: As selected by Architect from manufacturer's full range.

# 2.2 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

- 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sg. cm.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
  - 2. Flexco
  - 3. Johnsonite; a Tarkett company.
  - 4. Roppe Corporation, USA.
- C. Stair Treads: ASTM F2169.
  - 1. Type: TP (rubber, thermoplastic).
  - 2. Class: 2 (pattern; embossed, grooved, or ribbed).
  - 3. Group: 2 (with contrasting color for the visually impaired).
  - 4. Nosing Style: Square.
  - 5. Nosing Height: 2 inches.
  - 6. Thickness: 1/4 inch and tapered to back edge.
  - 7. Size: Lengths and depths to fit each stair tread in one piece.
- D. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
  - 1. Style: Toeless, by length matching treads.
  - 2. Thickness: Manufacturer's standard.
- E. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- F. Locations: Provide rubber stair accessories in areas indicated.
- G. Colors and Patterns: As selected by Architect from manufacturer's full range.

#### 2.3 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, provide products by the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - Roppe Corporation, USA.
- B. Description: Rubber transition strips.
- C. Profile and Dimensions: As indicated or as required by project conditions.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors and Patterns: As selected by Architect from manufacturer's full range.

## 2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

## 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
  - 1. Inside Corners: Use straight pieces of maximum lengths possible.
    - a. Miter or cope corners to minimize open joints.

## 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
  - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
  - 2. Tightly adhere to substrates throughout length of each piece.
  - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

## 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum horizontal surfaces thoroughly.
  - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

#### SECTION 099113 - EXTERIOR PAINTING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. CMU.
  - 2. Galvanized metal.
  - 3. Steel.
  - 4. Wood.

## B. Related Requirements:

1. Section 079100 "Water Repellants" for sealer to be applied at exterior surfaces of CMU, including occupied side of dugout walls.

## 1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.6 FIELD CONDITIONS

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

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Benjamin Moore & Co.
  - 2. Glidden Professional.
  - 3. PPG Architectural Coatings.
  - Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

# 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

# F. Wood Substrates:

- 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
- Sand surfaces that will be exposed to view, and dust off.
- 3. Prime edges, ends, faces, undersides, and backsides of wood.
- 4. After priming, fill holes, nail holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried. Caulk joints and edges of batten strips and tool smooth before painting.

# 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.

- 2. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

## 3.4 CLEANING AND PROTECTION

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

## 3.5 EXTERIOR PAINTING SCHEDULE

- A. CMU:
  - 1. Two coats water repellant as indicated at Section 071900 "Water Repellants".
- B. Steel Substrates:
  - 1. Water-Based Light Industrial Coating System, MPI INT 5.1B:
    - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
      - 1) Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W01310.
    - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    - Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5, MPI #153).
      - 1) Sherwin-Williams, Pro Industrial, Acrylic Semi-Gloss Coating, B66W00651.
- C. Galvanized-Metal Substrates:
  - 1. Water-Based Light Industrial Coating System MPI EXT 5.3J:

- a. Acrylic Prime Coat: Primer, galvanized, water based, MPI #134.
  - 1) Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W1310.
- b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- c. Semigloss Topcoat: Light industrial coating, exterior, water based, semigloss (MPI Gloss Level 5), MPI #163.
  - 1) Sherwin-Williams, Pro Industrial, DTM Semi-Gloss, B66W01151.

## D. Wood Substrates:

- 1. Alkyd System, MPI INT 6.2C:
  - a. Prime Coat: Primer sealer, alkyd, interior, MPI #45.
    - 1) Sherwin-Williams, Extreme Block, Stain Blocking Primer / Sealer, B49W00600.
  - b. Intermediate Coat: Alkyd, interior, matching topcoat.
  - c. Topcoat: Alkyd, interior, semigloss (MPI Gloss Level 5), MPI #47.
    - 1) Sherwin-Williams, ProMar 200, Alkyd Semi-Gloss, B34W02251.

END OF SECTION 099113

#### SECTION 099123 - INTERIOR PAINTING

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. CMU.
  - 2. Steel and iron.
  - 3. Galvanized metal.
  - 4. Gypsum board.

## B. Related Requirements:

- Low VOC coatings complying with Utah Administrative Code R307-361 are required as work of this Section.
- 2. Section 051200 "Structural Steel Framing" for shop priming structural steel.
- 3. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
- 4. Section 055213 "Pipe and Tube Railings" for shop priming pipe and tube railings.

## 1.3 DEFINITIONS

- A. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include preparation requirements and application instructions.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

# 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

## 1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Benjamin Moore & Co.
  - 2. Glidden Professional.
  - 3. PPG Architectural Coatings.
  - 4. Sherwin-Williams Company (The).
  - 5. Prosoco
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

# 2.2 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. VOC Content: Utah Administrative Code R307-361 Products shall comply with VOC limits of authorities having jurisdiction and, for interior and exterior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 100 g/L.
  - 3. Dry-Fog Coatings: 150 g/L.
  - 4. Primers, Sealers, and Undercoaters: 100 g/L.
  - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
  - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
  - 7. Pretreatment Wash Primers: 420 g/L.
  - 8. Floor Coating Foot Traffic: 100 g/L.
  - 9. Floor Coatings High Performance: 250 g/L.
  - 10. Shellacs, Clear: 730 g/L.
  - 11. Shellacs, Pigmented: 550 g/L.

- C. Low-Emitting Materials: For field applications that are inside the weatherproofing system, verify 90 percent of paints and coatings comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Colors: As indicated in a color schedule.

## 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

# 3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  - 1. SSPC-SP 3.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

## 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in equipment rooms:
    - Uninsulated metal piping.
    - b. Pipe hangers and supports.
    - c. Metal conduit.
    - d. Tanks that do not have factory-applied final finishes.
    - Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - 2. Paint the following work where exposed in occupied spaces:
    - a. Uninsulated metal piping.
    - b. Pipe hangers and supports.
    - c. Metal conduit.
    - d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - e. Other items as directed by Architect.
  - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- F. Concrete Sealers: Apply at rates indicated by manufacturer, and according to manufacturer's written instructions.
  - 1. Etch concrete prior to applying stain.

# 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

# 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

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- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

# 3.6 INTERIOR PAINTING SCHEDULE

- A. Exposed Concrete Floors at Announcer Booth building:
  - 1. Blended, reactive silicate hardener/densifier and dustproofer sealer: One coat low pressure spray applied, spread and dry buffed in both directions per manufacturer's instructions.
    - a. Prosoco "Consolideck LS/CS".

#### B. CMU Substrates:

- Water-Based Epoxy High Performance System at Announcer Booth building Concession and toilet room walls:
  - a. Prime Coat: Acrylic resin surfacer, interior/exterior:
    - 1) S-W Loxon Block Surfacer, A24W200, <100 g/L VOC.
  - b. Intermediate Coat: Epoxy, matching topcoat.
  - c. Top Coat: Epoxy, semi-gloss (MPI Gloss Level 5):
    - S-W Pro Industrial PreCatalyzed Water-Based Epoxy Semi-gloss, K46 series, <50 g/L VOC
- 2. Latex System:
  - a. Block Filler: Block filler, latex, interior/exterior.
    - 1) S-W PrepRite Block Filler, B25W25, <50 g/L VOC.
  - b. Intermediate Coat: Latex, interior, matching topcoat.
  - c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5).
    - 1) S-W ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC.

# C. Steel Substrates:

- 1. Water-Based Light Industrial Coating System, MPI INT 5.1B:
  - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
    - 1) Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W01310.
  - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
  - Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5, MPI #153).

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- 1) Sherwin-Williams, Pro Industrial, Acrylic Semi-Gloss Coating, B66W00651.
- D. Galvanized-Metal Substrates:
  - 1. Water-Based Light-Industrial Coating System, MPI INT 5.3K:
    - a. Prime Coat: Primer, galvanized, water based, MPI #134.
      - 1) Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W1310.
    - b. Intermediate Coat: Light-industrial coating, interior, water based, matching topcoat.
    - c. Topcoat: Light-industrial coating, interior, water based, semigloss (MPI Gloss Level 5), MPI #153.
      - 1) Sherwin-Williams, Pro Industrial, Acrylic Semi-Gloss Coating, B66W00651.
- E. Gypsum Board Substrates:
  - 1. Water-Based Light-Industrial Coating System, MPI INT 9.2L:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
      - 1) Sherwin-Williams, ProMar 200 Zero, Interior Latex Primer, B28W02600 / B28WQ2600.
    - b. Intermediate Coat: Light-industrial coating, interior, water based, matching topcoat.
    - c. Topcoat: Light-industrial coating, interior, water based, semigloss (MPI Gloss Level 5), MPI #153.
      - 1) Sherwin-Williams, Pro Industrial, Acrylic Semi-Gloss Coating, B66W00651.

END OF SECTION 099123

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#### SECTION 104416 - FIRE EXTINGUISHERS

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

# 1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

# 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each type of fire extinguisher indicated, with mounting bracket.

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- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - b. Larsens Manufacturing Company.
  - c. Potter Roemer LLC.
- 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
- 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
- C. Purple-K Dry-Chemical Type in Aluminum Container: UL-rated 30-B:C, 5-lb nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.

# 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - b. Larsens Manufacturing Company.
    - c. Potter Roemer LLC.
  - 2. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
  - 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 4. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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# 3.2 INSTALLATION

- A. General: Install fire extinguishers at locations where Fire Extinguisher Cabinets are indicated and with mounting brackets in locations where only extinguishers are indicated, and in compliance with requirements of authorities having jurisdiction.
  - 1. Mounting Brackets: Top of fire extinguisher to be as indicated in the Drawings.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

**END OF SECTION 104416** 

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#### SECTION 116633 - EXTERIOR SPORTS EQUIPMENT

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. This Section includes sports equipment consisting of the following:
  - 1. Baseball and softball equipment.
  - 2. Safety wall padding.
  - Batting cages.
  - 4. Netting backstops for softball and baseball.
- B. Related Sections include the following:
  - 1. Section 0123000 "Alternates" for description of applicable bid alternates.
  - 2. Section 312000 "Earth Moving" for filling and grading work.
  - 3. List below only products and construction that the reader might expect to find in this Section but are specified elsewhere.
  - 4. Section 323113 "Chain Link Fences and Gates" for perimeter fence requirements.

# 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For all equipment, submit product information including plans, details, method of field assembly, connections, and installation details.
- C. Samples for Verification: For the following products, for each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected. Architect reserves the right to require additional Samples that show fabrication techniques, workmanship, and design of playground equipment.
- D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.

# 1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer who has specialized in providing work similar in material, design, and extent to that indicated for this project.

# 1.5 PROJECT CONDITIONS

- A. Layout: Provide locations for equipment in accordance with regulations for current season. .
  - 1. Notify Architect during layout and prior to placement.
  - 2. Do not proceed with placement without Architect's written permission.
  - 3. Before excavating, verify that no conflicts exist with underground services, piping or irrigation systems.

# PART 2 - PRODUCTS

# 2.1 PRODUCTS AND MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed throughout the section and the following:
- B. Baseball / Softball Field Equipment and Accessories:
  - 1. Cover Sports USA.
  - 2. Fisher Athletic.
  - 3. Global Industrial.
  - 4. Hoover Fence Company.
  - 5. Jaypro.
  - 6. M Putterman, Inc.
  - 7. PW Athletic Mfg. Co.
  - 8. Performance Athletics.
  - 9. Promats Athletics.
  - 10. Schutt Sports.
  - 11. Sportsfield Specialties.
  - 12. SportsGraphics.
  - 13. Starland Metals.

# 2.2 DESIGN STANDARDS

A. Design Standards: Design Standards are used to establish a level of quality for the work. Premium products equal in quality of acceptable manufacturers may be used. The use of a Design Standard is not to be construed as a limit of competition or a constraint of trade.

# 2.3 EXTERIOR SPORTS EQUIPMENT, GENERAL

A. Colors: Match Architect's samples, custom colors required.

# 2.4 BASEBALL/SOFTBALL FIELD EQUIPMENT

A. Cap Protector: Corrugated polyethylene tubes, nominal 4-½ inch diameter, supplied with matching ties for covering to selvage edge of chain link full length of outfield fence including warning track beyond baselines. Equal to Cover Sports USA Fence Crown.

- B. Field Bases and Accessories: Set of 3 bases for each field including double first base orange/white for Softball, with 6-inch stanchions; each with ground anchor. Rubber plugs for ground anchors.
  - 1. Design Standard (Bases): Ewing Irrigation and Landscape Supply, Schutt Sports, Jack Corbett MLB Hollywood Base Set, Set of 3, with 6-inch stanchions, 68500114.
    - a. Anchor bases per manufacturer's requirements.
  - 2. Design Standard (Ground Anchors): Ewing Irrigation and Landscape Supply, Steel C/H Anchor, 68500000, provide one per base.
  - 3. Design Standard (Ground Anchor Plugs): Ewing Irrigation and Landscape Supply, Schutt Sports Base Anchor Mushroom Plug, set of 3, 68500141.
- C. Home Plate: All-rubber home plate with waffle bottom. 1 per field. Edges and corners designed to avoid catching spikes. 100% waterproof.
  - 1. Design Standard: Ewing Irrigation and Landscape Supply, Waffle Bottom Home Plate, 68500052.
- D. Pitching Rubber: Molded rubber, 4-sided, high-durability pitching rubber with interior tub designed for concrete fill. Fill with concrete before installation.
  - 1. Design Standard: Ewing Irrigation and Landscape Supply, Schutt Pro Pitching Rubber, 6-inches by 24-inches, 68500030.
- E. Safety Wall Padding: Equal to SportsGraphics, Field Wall Pads, FWP-PP. 48-inch high panels. Graphics not required.

#### 2.5 BATTING CAGES

- A. Provide four tunnels as indicated on Drawings.
- B. Components: Basis-of-Design Product: Sportsfield Specialties; Model BTOSD double overhead batting tunnel configuration.
  - Overhead Batting Tunnel Style.
    - a. Upright Poles and Overhead Crossbars: Fabricated of 4 inch O.D. x 1/8 inch (0.125") thick wall 6061 aluminum tube.
    - b. Aluminum Net Attachment Extension Arms: Fabricated of 2 inch x 2 inch x 1/8 inch (0.125") square aluminum tube and 4 inch schedule 40 aluminum pipe.
    - c. Ground Sleeves:
      - 1) 30 inches deep.
      - 2) Aluminum pipe with welded base plate, include upright pole alignment bolt and black plastic friction fit cap.
      - 3) Welded leveling plate.
    - d. Net: 13 ft high x 14 ft wide x 55 ft long, Softball Standard #36 Black Nylon Net, 1-3/4 inch square mesh with rope bound perimeter.
      - 1) 4 ft wide x full height overlapped entryways.
      - 2) Black vinyl encased 1/4 inch galvanized chain ground weight.
    - e. Fully retractable double pulley system.
    - f. Model Specific Hardware Kit and Installation Instructions.

# 2.6 NETTING BACKSTOP SYSTEMS

- A. Tensioned Ball Safety Netting:
  - 1. Design Standards: Sportsfield Specialties TNPPSUC at Softball, TNPPBUC at Baseball.
    - a. Tension Ball Safety Netting System Upright Support Posts , 6.625 x .280 posts at Softball and 8.625 x .322 posts at Baseball.
      - 1) Height Above Finish Grade: 24'-0" at Softball; 40'-0" at Baseball.
      - 2) Powder Coated Finish: Color as selected by Architect.
      - 3) Ground Sleeve Permanent Embedment Mount.
      - 4) Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware: Quantities, sizes and configurations as required.
  - 2. Tension Ball Safety Netting System Galvanized Wire Rope Support Structure:
    - a. Length, Height and Configuration as required.
    - b. Galvanized Steel 6 X 25 Wire Rope, 3/4" Diameter main.
      - 1) Horizontal Support, 53,000 lb. Minimum Breaking Strength.
      - 2) 17,667 lb. Minimum Working Load Limit.
    - c. Galvanized Steel 7 X 19 Wire Rope, 1/4" diameter main.
      - 1) Horizontal Support, 7,000 lb. Minimum Breaking Strength.
      - 2) 2,333 lb. Minimum Working Load Limit.
    - d. Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware: Quantities, sizes and configurations as required.
  - 3. Tension Ball Safety Netting System Net and Rope Bound Border:
    - a. Length, Height and Configuration as Required.
  - 4. Tie-Back Tension Ball Safety Netting System Net and Rope Bound Border:
    - a. Length, Height and Configuration as Required.
    - b. #36 Twisted Knotted Netting.
    - c. 100% Nylon Construction.
    - d. 2.6 mm (0.1023") Diameter Twine.
    - e. 87% Open Mesh Area (See-Through Visibility).
    - f. 13,363 psi Minimum Breaking Strength.
    - g. 1-3/4" Square Mesh Size, 0.0425 lbs. per Square Foot.
    - h. Black Multi-Filament Polypropylene Solid Braid Derby Rope Sewn Binding on Perimeter Edges: 1/4" diameter, 530 lb. minimum breaking strength.
    - i. UV and Weather Treated.
  - 5. Accessories:
    - a. Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware: Quantities, sizes and configurations as required.
    - b. Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of Project Location.

# 2.7 MATERIALS

- A. Hardware: Manufacturer's standard, commercial-quality, corrosion-resistant, hot-dip galvanized steel and iron, stainless steel, or aluminum; secure, vandal-resistant design.
- B. Fasteners: Manufacturer's standard, corrosion-resistant, hot-dip galvanized or plated steel and iron, or stainless steel; permanently capped; theft resistant.
- C. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
  - Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

# 2.8 FABRICATION

A. General: Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with structural performance and other requirements. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete structure, including supporting members and connections.

# 2.9 CAST-IN-PLACE CONCRETE

- A. Concrete Materials and Properties: Provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch- maximum size aggregate.
  - 1. Refer to Section 033000 "Cast-in-Place Concrete" for additional requirements.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, site surface and subgrade drainage, and other conditions affecting performance.
  - 1. Do not begin installation before final grading required for placing protective surfacing is completed, unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

A. Verify that layout and equipment locations comply with requirements for each type and component of equipment.

# 3.3 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Anchor equipment securely, positioned at locations and elevations indicated on Shop Drawings.
- B. Post and Footing Excavation: Hand-excavate holes for posts and footings to dimensions, profile, spacings, and in locations indicated on Drawings, in firm, undisturbed or compacted subgrade soil. Level bearing surfaces with drainage fill to required elevation.
- C. Post Setting: Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Verify that posts are set plumb or at the correct angle and are aligned and at the correct height. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
  - 1. Concrete Footings: Smooth top, and shape to shed water.

#### 3.4 CLEANING

A. After completing equipment installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 116633

#### SECTION 123616 - METAL COUNTERTOPS

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section Includes:
  - 1. Stainless-steel countertops.

# 1.3 COORDINATION

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

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For metal fabrications.
  - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
  - 2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.
- B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

#### 1.6 FIELD CONDITIONS

A. Field Measurements: Where products are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

#### PART 2 - PRODUCTS

# 2.1 STAINLESS-STEEL FABRICATIONS

- A. Countertops: Fabricate from 0.062-inch- thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.
  - 1. Joints: Fabricate countertops without field-made joints.
  - 2. Weld shop-made joints.
  - 3. Sound deaden the undersurface with heavy-build mastic coating.
  - 4. Extend the top down to provide a 1-inch-thick edge with a 1/2-inch return flange.
  - 5. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.
  - 6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.

#### 2.2 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and the following:
  - 1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, acid curing, silicone.
  - 2. Color: As selected by Architect from manufacturer's full range.

# 2.3 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.

- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- D. Seal junctures of countertops, splashes, and walls with sealant for countertops.

# 3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123616

SECTION 220000 - PLUMBING

PART 1 – GENERAL

# 1.1 SCOPE OF WORK

- A. Piping diagrams indicate runs and are intended to be complete. Where fixtures are not shown connected to any services required, they shall be connected properly and completely. Connect all fixtures to various services, i.e., hot water, cold water, waste, vent, etc., as required. The work shall include furnishing of all materials and labor required for the job as described, together with all minor items implied or required to finish the entire work, and generally as follows:
  - 1. Plumbing fixtures and piping.
  - 2. Sanitary sewer & vent systems.
  - 3. Above floor grease interceptor and piping

# 1.2 STANDARDS

- A. Plumbing installation shall be made in accordance with the 2018 International Plumbing Code, State Code, and all other applicable governing codes. In event drawings violate the codes, the contractor shall base his estimate on the code requirements.
- B. See schedule on plans for sizing branch water lines to fixtures.

# 1.3 BURYING PIPE

- A. Outside water pipe placed underground shall be buried deep enough to protect against freezing. Minimum depth of bury to be 60".
- B. <u>Freeze Protection:</u> All water piping systems shall be installed and sloped to drain for winterizing purposes. Provide curb stop isolation and drain valves in 36" x 24" concrete meter box for isolating and draining the potable water systems in the building. Provide compressed air Schrader Valves for blowing out the system with compressed air where indicated. Where water lines run vertically concealed in walls or above ceilings, contractor shall provide drain valves at low point of any vertical lines to adequately drain the piping.

# 1.4 DISINFECTING

A. After flushing the mains, introduce a water and chlorine solution concentrated to 300 P.P.M. to disinfect the system and oxidize piping contaminants. Retain treated water and chlorine for a period of not less than three hours or more than six hours before final flushing out of system.

#### 1.5 VERIFICATION OF GRADE

A. The contractor shall excavate the point of actual connection of waste piping systems to the street mains and shall verify the actual elevation and location prior to the installation of building footings or any plumbing piping.

PLUMBING 220000 - 1

# PART 2 - PRODUCTS

# 2.1 CLEANOUTS

A. Approved cleanouts shall be installed in the base of each vertical drainage line, and in the horizontal line at each 90-degree change in direction. In addition, there shall be cleanouts spaced at a maximum of 50' in all horizontal lines. All cleanouts shall be extended to accessible surfaces.

# 2.2 WATER HAMMER

- A. Provide and install stainless steel bellows type shock absorbers in the ends of all multiple fixture water lines and in piping ahead of snap-acting automatic valves.
- B. Absorbers shall be sized and located in compliance with manufacturer's recommendations for the specific application. Absorbers shall be Zurn, Wade or Smith.
- C. Absorbers shall not be installed in inaccessible areas. Extend piping to accessible location.

#### 2.3 FLASHINGS

A. All pipes passing thru the roof shall be neatly flashed watertight with approved standing seam metal roof jacks. Roof jacks shall match roofing style, slope and color.

#### 2.4 FIXTURE STOPS

A. All stops for plumbing fixtures shall be chrome plated BrassCraft or McDonald 1/4 turn loose key ball valves.

# 2.5 PLUMBING FIXTURES

- A. The contractor shall furnish and install all fixtures shown or specified hereinafter and make all parts complete and leave the entire system in perfect working order. He shall clean and adjust all fixtures before leaving the job. Any damaged or cracked fixtures shall be replaced at the contractor's expense.
- B. The fixtures shall be all new and complete as shown or described in catalog or required for the work, including accessible 1/4 turn loose key compression stops above the floor in supplies to all fixtures, and cast brass P-traps, unless otherwise shown. Trim for all fixtures shall be chrome-plated, and all trim shall match in design. Supply faucets shall have renewable seats and barrels.

PLUMBING 220000 - 2

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C. Approved Fixtures:

Water closets & lavatories: Willoughby, Acorn, or approved equal

Flush valves: Zurn, Sloan, or approved equal.

Lavatories: Willoughby, Acorn, or approved equal

Sinks: Just, Elkay, or approved equal.

Faucets: Moen, Kohler, American Standard, or approved

equal.

Drinking fountains: Murdock, Acorn, Elkay, or approved equal.

Hose bibbs: Watts, Zurn, JR Smith, Woodford, or approved

egual.

Tempering valves: Bradley, Symmons, Watts, or approved equal.

Floor drains, floor sinks: Zurn, JR Smith, Watts, Josam, or approved equal.

Above floor grease interceptor: Zurn, JR Smith, or approved equal.

# PLUMBING FIXTURES

WC-1 Water Closet:

(ADA)

Willoughby Model ETW-1490-FM-FA ADA compliant, 14-gauge, 304 stainless steel all welded construction. Front mounted, floor outlet, floor mounted, siphon jet (35 psig minimum). Elongated bowl with contoured seat. Exposed SS surfaces to be polished to a #4 satin finish. Integral crevice-free self-draining flushing rim with positive afterfill, bead blasted finish for bowl interior.

Provide a Zurn Model ZH6611AV-MBP ADA compliant hydraulic activated 1.6 gpf flush valve for penal water closets. Provide 21" vacuum

breaker tube.

Fixture shall withstand loadings of 5,000 lbs.

Fixture shall be provided complete with all mounted brackets, etc. Model shall meet requirements of ASME A112.19.19.3/CSA

L-1 Lavatory:

(ADA)

Willoughby Model HS-1014-96-HC-FA 18" wide 14-1/2" x 9-1/2" x 4-3/8" deep bowl. Deck mounted 0.5 gpm electronic push-button faucet, cast brass slip-joint P-trap, ADA compliant, 14-gauge 304 stainless steel all welded construction. Watts USG-B ASSE 1070 thermostatic mixing valve Exposed SS surfaces to be polished to a #4 satin finish. Provide removable bottom panel with vandal resistant screws.

Provide all mounting brackets and hardware for a complete installation.

Provide tempering valve TV-1.

**PLUMBING** 220000 - 3

S-1	Hand sink: (Concessions)	Just A-33338 18" x 20", 18 ga. 304 stainless steel, drilled for 3-hole 4" center set faucet, self-rimming, sound dampening, cup strainer, Moen 4903 ADA faucet with gooseneck and ADA handles for tempered water with grid strainer. Watts USG-B ASSE 1070 thermostatic mixing valve Tailpiece and flexible supplies w/ stops and brass P-trap. Support lavatory with Zurn ZN1231 concealed arm carrier with foot support. Shall have both tempered water and cold-water connections. Provide tempering valve TV-1.			
S-2	3-Comp. Sink: (Concessions)	Sink: Just 3-compartment NSFB-354-24RL-12/12 3-compartment scullery sink with left & right drainboards. 96" L. x 27.5" D. x 12" bowl depth, 14 gauge 304, 18-8 stainless steel. drilled for backsplash faucet, roll rim on front & sides, polished satin blended No. 4 finish, J-35-SSf cup strainer, J-35-BLA-2 strainer drain with handle, JCW-202 tailpiece, JF-1535 overflow, JT-200 P-trap, (2) JS-48-TA1 backsplash mounted gooseneck faucet with ADA handles, and aerator, flexible supplies and all accessories to meet all requirements of NSF std.2.			
BF-1	Bottle Filler:	Murdock Model M-0BR4-BAT-FRFA1 Recessed outdoor bottle filler. 9V hands-free battery powered sensor operated bottle filler, freeze resistant valve, Vandal resistant, ADA compliant. Satin Stainless Steel finish.			
TV-1	Tempering Valve:	Watts series USG-8 (ASSE 1070) tempering valve, 3/8" inlets and 3/8" outlet, to mix cold water with 120 deg. F. hot water for 110 deg. F. tempered water supply50 GPM min. flow and 1 GPM at 10 psi pressure drop. Tempering valve shall be complete with check stops, bronze body, and adjustment cap with locking feature.			
HB-1	Hose Bibb:	Zurn Z-1320CL 3/4" "Ecolotrol" non-freeze anti-syphon wall hydrant with copper casing, nickel bronze face, integral vacuum breaker, locking cylinder & wall clamp. Minimum length from face to valve 18". Hydrant to be centered in block course.			
HB-2	Hose Bibb:	Chicago Faucet #952 3/4" sill faucet with 3/4" hose thread outlet with #293-6 removable tee handle, chrome-plated, with wall flange and vacuum breaker.			
FD-1	Floor Drain:	Zurn #Z-415-4 2" cast iron drain with nickel bronze top. Drain to have deep seal P-trap with Proset "Trap Guard".			
FD-2	Floor Drain:	Zurn #Z-415S 2" cast iron drain with nickel bronze top. Drain to have deep seal P-trap with Proset "Trap Guard".  Drain set for wood floor application.			
A-1	Schrader air valve:	See plans for detail.			
FS-1	Floor Sink:	Zurn ZN-1900-3" sanitor floor sink with 12" x 12" square top, full removable grate with center opening. N.B. dome, sani-coated exterior, acid resistant enamel interior, and Z-100 deep seal trap. Sink shall be complete with slotted stainless steel sediment bucket, full grate, 3/4 grate, 1/2 grate, etc. as necessary to match application. Sink to be installed flush with floor			

PLUMBING 220000 - 4

with floor.

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GI-1 Grease Zurn ZS-1173-500 Ejecto-Matic above floor type interior grease

Interceptor: interceptor. 3' high inlet and outlet. 304 stainless steel interior and exterior.

Internal air relief by-pass, cleanout plug with plug wrench, visible double wall trap with removable combination pressure equalizing/flow diffusing baffle and sediment tray, grease retention tray shall be adjacent to grease

draw-off valve. Gasketed secured cover & flow control fitting.

#### 2.6 ELECTRIC WATER HEATER

A. Water heater shall be electric vertical tank type. 4500 Watts at 240/1/60, with a rated storage capacity of not less than 40 gallons storage with a minimum recovery of 18 GPH at 100 deg. F. temperature rise. The tank shall be glass lined. The tank shall consist of a minimum of (3) copper screw type immersion elements. The tank shall have one magnesium anode rod. The heater shall be insulated with not less than 1" of Non-CFC foam. The heater shall be equipped with an ASME T&P relief valve. The entire installation shall be made in compliance with state and local ordinances.

Manufacture: Bradford White

Model: LE140L

Nominal Size: 22" Dia. x 32-13/16" H.

Shipping Weight: 115 lbs.

Water heaters shall be A.O. Smith, State, Bradford White or approved equal.

# 2.7 CIRCULATORS

- A. Furnish and install the circulators shown and specified on the drawings. Circulators shall be of the in-line, pipe-mounted, motor driven, centrifugal type. All motors shall operate at 1750 RPM. Circulators shall operate at high efficiency and shall have a quiet, vibrationless operation. Provide steel support for motor. All circulators to be all bronze construction.
- B. Circulators shall be Bell & Gossett Taco or Gundfoss.

PLUMBING 220000 - 5

# PART 3 - EXECUTION

# 3.1 PRODUCT HANDLING

- A. <u>Protection:</u> Use all means necessary to protect plumbing materials before, during, and after installation and to protect the installed work and materials of all other trades.
- B. <u>Replacements:</u> In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no additional cost to the Owner.

# 3.2 TESTING

A. Furnish all required personnel and equipment and make all tests required to receive the approval of the Owner and all agencies having jurisdiction.

# 3.3 CLEANING UP

A. Prior to acceptance of the building, thoroughly clean all exposed portions of the plumbing installation, removing all labels, and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item and being careful to avoid all damage to finished surfaces.

End of section 220000

PLUMBING 220000 - 6

#### SECTION 220700 - INSULATION

#### PART 1 – GENERAL

# 1.1 WORK INCLUDED

- A. It is the intent of this section of the specifications that all hot (above 120° F) and cold (below 55° F) surfaces of all piping and mechanical system components be insulated, unless specifically excluded herein.
- B. Systems to be insulated:
  - 1. Culinary hot, hot re-circulating and cold-water piping system
  - 2. Water and waste piping below lavatories and hand sinks
- C. The providing of all materials, supplies, equipment, tools, transportation, and facilities and performing all labor and service necessary to provide the work outlined above and as shown on the working drawings.

# PART 2 - PRODUCTS

#### 2.1 COMPLIANCE

- A. All insulation shall conform to the requirements of the building code and have a flame spread rating of less than 25 and smoke developed less than 50.
- B. Insulation shall be as manufactured by Schuller, Owens-Corning, Knauf, Armstrong, or Certainteed.
- 2.2 DOMESTIC HOT, HOT RE-CIRCULATING AND COLD-WATER PIPING
  - A. All piping shall be insulated with 2-piece heavy density pipe insulation having an average "K" factor of .25 BTU at 70 degrees F mean, with all-service jacket. Thickness of insulation shall be as follows:

# INSULATION THICKNESS IN INCHES FOR PIPE SIZES

PIPING SYSTEM TYPES	FLUID TEMP. RANGE, F	RUN- OUTS 2"	1" & LESS	1-1/4" TO 2"	2-1/2" TO 4"	5" TO 6"	8" & LARGER			
DOMESTIC HOT & COLD-WATER SYSTEMS										
Low Temp	40-200	1/2	1	1	1-1/2	1-1/2	1-1/2			

B. Pipe insulation shall be fastened with self-sealing adhesive strip edge. The insulation shall be covered with an all-service jacket.

- C. Fittings shall be insulated with mitered segments of insulation material wired in place and finished with a 1/4" layer of insulating cement. Flanges and valves shall be insulated with removable and replaceable covers fabricated from oversized pipe insulation and finished with an all-service PVC jacket.
- D. Valves shall be insulated as specified for fittings.

# 2.3 WATER & WASTE PIPING EXPOSED BELOW LAVATORIES AND HAND SINK

A. Insulate all exposed surfaces at all lavatories and handicapped sink fixtures with an approved ADA style insulation kit as required by sink or lavatory manufacturer.

#### PART 3 - EXECUTION

# 3.1 GENERAL

- A. The contractor shall provide a complete installation which is neat in appearance and functional. Remove all excess materials and packaging from job site.
- B. All insulation shall be continuous through wall and ceiling openings and through sleeves. Insulation on all cold surfaces where vapor barrier jackets are used will be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor-sealed to prevent condensation.
- C. Elbows, valves, and fittings inside the building shall be insulated as specified for the piping systems and covered with high temperature P.V.C. insulation fitting covers, or alternate method approved by the Architect/Engineer.
- D. Insulation inserts and shields shall be installed on all hot and cold fluid piping systems such as domestic hot and cold-water piping at the hanger supports.
- E. Inserts between the pipe and pipe hangers shall consist of rigid calcium silicate pipe insulation of equal thickness to the adjoining insulation and shall be provided with vapor barrier, where required. Insulation inserts shall not be less than the following lengths:
  - 1/2" to 2-1/2" pipe size 6" long.
  - Rigid insulation shall have characteristics suitable for temperature, moisture and load conditions of the particular pipe being supported.
- F. Rigid metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and length specified for the insulation hanger inserts.
- G. Vapor barrier wrap shall be sealed tight and not penetrated by the hanger or shield. Specified adhesives, mastics, and coatings shall be applied at the manufacturer's recommended minimum coverage per gallon. Where insulation pipes pass thru sound or fire-rated walls, floors, or ceilings, the insulation sleeves shall be sound or fire-rated to match rating of surface penetrated.

# 3.2 INSULATION WORKMANSHIP

A. All insulation shall be applied by specialists experienced in the field and shall be neat in appearance. Neatness in appearance shall be equated to proper insulation application procedures, and sloppy workmanship will not be tolerated. Work which is deemed unacceptable shall be condemned, removed, and replaced at the contractor's expense. Protect floors, valve handle, accessories, etc., to keep paste off areas not being insulated.

# 3.3 CLEAN UP

The piping shall be cleaned and tested prior to installation of insulation, and fittings shall be cleaned after insulation is installed.

End of section 230700

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# SECTION 230100 - GENERAL PROVISIONS

# PART 1 – GENERAL

# 1.1 GENERAL CONDITIONS

A. The contractor shall carefully read the General Conditions of the Contract and all information to bidders which, with the following specifications for plumbing and exhaust systems are a part of the Contract.

# 1.2 BASIC BID

A. Shall include all labor and materials specified in this division. The term "furnish" and/or "install" or similar implication shall mean "furnish and install complete."

# 1.3 SCOPE OF WORK

- A. The work to be done under this section includes the furnishing of all labor, materials, equipment, controls and accessories required to complete all plumbing, drainage, and other mechanical systems as shown on plans and/or described in these specifications, or as required to provide a complete and functional facility.
- B. Work shall include, but shall not be necessarily limited to, the following:
  - 1. Insulation systems
  - 2. Exhaust systems
  - 3. Culinary hot, hot re-circulating and cold-water systems
  - 4. Plumbing systems
- C. This contractor shall provide all miscellaneous electrical work and control wiring for special systems where the wiring requirements are provided by the equipment manufacturers and/or suppliers.

# 1.4 CODES AND ORDINANCES

- A. The work shall be installed in accordance with the state and local plumbing codes, and any other government code or ordinance that governs the type of work covered by these specifications. Should any drawings conflict with the city, county, or state code, the code shall govern the proper installation of the work, and no extra charge shall be made for such change.
- B. Should the contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- C. Where the work required by the drawings and specifications exceeds local requirements, it shall be done as shown or specified.

# 1.5 DRAWINGS AND SPECIFICATIONS

A. These specifications are intended to cover all labor, material, and standards of mechanical workmanship to be employed in the work shown on the drawings and called for in these specifications or reasonably implied by terms of same. The drawings and specifications are intended to supplement one another, and any part of the work that may be mentioned in the one and not represented in the other shall be done the same as if it had been mentioned or represented in both.

# 1.6 INTERPRETATION OF DRAWINGS AND DOCUMENTS

- A. Any interpretation or correction of the proposed documents will be made only by addenda duly issued, and a copy of such addenda will be mailed or delivered to each person receiving a set of such documents.
- B. The Owner's representative will interpret the meaning of any part of the drawings and specifications about which any misunderstanding may arise, and his decisions will be final. Should there appear to be any error or discrepancy in or between the drawings and specifications, the contractor shall refer the matter to the Owner's representative for adjustment before bidding the work. Should the contractor proceed with the work without so referring the matter, he does so on his own responsibility.

# 1.7 WORKMANSHIP

A. Workmanship shall be the best quality of its kind for the respective industries, trades, crafts, and practices, and shall be acceptable in every respect to the Owner's representative.

# 1.8 SUBSTITUTIONS

A. See Special Conditions pertaining to Substitutions.

#### 1.9 FEES AND PERMITS

- A. This contractor shall obtain all necessary permits and pay all fees required in connection with the work.
- B. Rules of local utility companies shall apply at time of bidding. Contractor shall have checked with each utility company supplying services to this installation, and shall determine from them all valves, boxes, meter boxes, and meters which they will require to be installed, and shall figure cost of same in his bid. No extra payment will be made for installation of such items.

#### 1.10 SITE INSPECTION AND EXAMINATION OF DRAWINGS

- A. The contractor shall carefully study all drawings and specifications pertaining to the work. If any of the work as laid out, indicated, or specified is contrary to or conflicts with any governing ordinances or regulations, the same shall be reported to the Owner's representative before submitting a bid. The Owner's representative will then issue instructions as to procedure.
- B. The contractor shall carefully examine the building site and compare the drawings with existing conditions. By the act of submitting a bid, the contractor shall be deemed to have made examination, have accepted such conditions, and to have made allowance therefore in preparing their bid.

# 1.11 VERIFICATION OF DIMENSIONS

A. Before proceeding with any work, the contractor shall carefully check and verify all dimensions, sizes, etc., and shall assume full responsibility for the fitting-in of his ductwork, piping, and equipment. Where apparatus and equipment has been indicated on the drawings, dimensions have been taken from typical equipment of the class indicated. The contractor shall carefully check the drawings to see that the equipment he is required to install will fit into the spaces provided and will allow for proper maintenance and service of the equipment.

# 1.12 RECORD DRAWINGS

A. The contractor shall keep up to date a complete record set of prints which shall be corrected daily to show changes from the original drawings and specifications, the size and kind of equipment, location and inverts of all buried or concealed pipes and ducts, etc. Upon completion of the work, the set of record drawings shall be turned over to the Owner's Representative.

# 1.13 COOPERATION WITH OTHERS

A. The contractor shall so organize the work that progress will harmonize with the work of all trades, so that all work may proceed as expeditiously as possible.

# 1.14 LOCATION OF PIPING AND EQUIPMENT

A. The locations of all piping, ducts, apparatus, and equipment indicated on the drawings are approximate only, and shall be changed, as necessary and as approved by the Owner's Representative, to meet the actual structural and architectural conditions at the job site. Any change in work which has not been installed shall be made by the contractor without additional compensation, except changes which are caused by architectural and structural changes which increase the size of mains, the number of fixtures or the length of runs. All changes shall be made only upon approval of a written change order.

# 1.15 GUARANTEE

- A. By the acceptance of the contract award for the work herein described, the contractor assumes the full responsibility imposed by the guarantee as set forth herein and should protect himself through proper guarantee from equipment and specialty manufacturers and subcontractors as their interests may appear.
- B. All materials and equipment provided and installed under this division of the specifications shall be guaranteed for a period of one (1) year from the date of substantial completion and acceptance by the Owner.

#### 1.16 SHOP DRAWINGS & SAMPLES

A. After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, the contractor shall submit to the owner's representative for review in accordance with the accepted schedule of Shop Drawing submissions, or for other appropriate action if so indicated in the Supplementary Conditions, five copies (unless otherwise specified in the General Conditions) of all Shop Drawings, which will bear a stamp or specific written indication the contractor has satisfied the contractor's responsibilities under the Contract Documents with respect to the review of the submission.

- B. Before submission of each Shop Drawing or sample the contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each shop drawing or sample with other Shop Drawings and samples and with the requirements of the work and the Contract Documents.
- C. At the time of each submission, the contractor shall give the Owner's representative specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to the Owner's representative for review and approval of each such variation.
- D. The Owner's representative shall review Shop Drawings for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The review shall not extend to means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The contractor shall make corrections required by the Owner's representative and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review and approval. The contractor shall direct specific attention in writing to revisions other than the corrections called for by the Owner's representative on previous submittals.
- E. The Owner's representative's review of Shop Drawings or samples shall not relieve the contractor from responsibility for any variation from the requirements of the Contract Documents unless the contractor has in writing called the Owner's representative's attention to each such variation at the time of submission and the Owner's representative has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any approval by the Owner's representative relieve the contractor from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of these specifications.
- F. Shop drawings shall be neatly bound in hard-backed looseleaf binders, completely indexed.
- G. Owner's Refusal Right: In the event that items submitted are substitutions for specified items and are found to be not acceptable, the right shall be reserved to require the specified items.

# 1.17 OPERATING INSTRUCTIONS AND CATALOG INFORMATION

- A. This contractor shall compile a digital catalog of every product used in the completion of the work.
- B. Digital catalog shall be identified as follows:

OGDEN HIGH SCHOOL BASEBALL FIELD RENOVATION
OGDEN SCHOOL DISTRICT
2022 - 2023
OPERATING & MAINTENANCE MANUAL
SET #

# PART 2 - PRODUCTS

# 2.1 MATERIALS, EQUIPMENT AND ACCESSORIES

- A. Unless otherwise specified, all equipment, accessories, and materials shall be new and undamaged, and the workmanship shall be of the best quality for the use intended and shall be acceptable to the Owner's Representative.
- B. Equipment, accessories, and materials shall be essentially the standard products of the manufacturer, or as specified herein.
- C. All equipment shall be selected to deliver full rated capacity at the job site elevation.

#### PART 3 - EXECUTION

# 3.1 FUNCTIONING AND OPERATION OF EQUIPMENT

A. Contractor's Responsibility: Installation and startup shall be so made that equipment will function together as a workable system and shall be left with all equipment properly adjusted and in working order. The contractor shall explain to the Owner the operation of the mechanical systems and fully instruct him regarding its proper operation, servicing, and maintenance.

# 3.2 CLEANING AND PATCHING BY MECHANICAL CONTRACTOR

A. The contractor shall remove all stains or grease marks on walls, floors, glass, hardware, fixtures, or elsewhere caused by his workmen, or for which he is responsible.

# 3.3 OPENINGS FOR MECHANICAL SYSTEMS

A. All openings required for installation of mechanical systems shall be provided by the mechanical contractor.

# 3.4 SAFETY REGULATION

A. The contractor shall comply with all local and OSHA safety requirements in performance with this work.

# 3.5 OWNER FURNISHED EQUIPMENT

A. This contractor shall include in his bid the necessary labor and material to install the required services to equipment furnished by the Owner.

End of section 230100

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SECTION 230593 - TESTING

#### PART 1 – GENERAL

# 1.1 DESCRIPTION

- A. The work outlined in this section shall be performed by the several trades involved.
- B. The mechanical contractor shall provide all supervision, labor, materials, tools, scaffolding, and equipment required to complete all system testing.
- C. The mechanical contractor shall remove and repair any defective component, as indicated by the system tests and retest.
- D. The contractor shall test the operation of all safety and high limit controls to insure proper installation and operation. Any defective devices shall be replaced.

# 1.2 TESTS AND ADJUSTMENTS

- A. Before any piping is covered, tests shall be made in the presence of the Owner's representative and any leaks or defective work corrected.
- B. Before application of insulation covering, and as far as practical before concealing any piping, all piping shall be hydrostatically tested and proved tight. Stubs shall be capped, and all control valves shall be removed during the test. System may be tested in sections, providing connections to last section tested are included in each succeeding test. Following minimum pressures shall be used for testing:
  - 1. Domestic hot, hot re-circulating and cold-water piping at 150 psig for six hours.
  - 2. Plumbing waste and vent piping at 10 ft. head for six hours.
  - 3. Exhaust air ducts in accordance with SMACNA standards.
- C. All valves and equipment which may be damaged shall not be subjected to the test pressure.

# PART 2 - PRODUCTS

# 2.1 EQUIPMENT

A. The contractor shall furnish all necessary gauges, plugs, etc., as required, to conduct the tests.

# 2.2 REPORTS

A. The contractor shall give the Owner's representative one week notice prior to performing the tests. All tests shall be recorded, and copies of reports bound in the O & M manuals and given to the Owner.

TESTING 230593 - 1

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# PART 3 - EXECUTION

# 3.1 PROCEDURE

- A. The contractor shall be responsible to conduct all tests in a safe manner, protecting the work of other trades from water or physical damage.
- B. The tests, as indicated, shall be in addition to any test, as required, by any governing agencies. Submit all approved test procedures and results, as required by governing agencies to the Owner's Representative.
- C. All tests, necessary repairs, and retest shall be performed by the contractor which installed the system.
- D. Upon completion of the work, the contractor shall demonstrate that all hot and cold-water piping systems are completely drainable. Contractor shall demonstrate that all traps are properly vented, that there is an ample supply of hot and cold water to fixtures, that no fixture or equipment can be back-siphoned, and that there are no backflow connections.

End of section 230593

TESTING 230593 - 2

# SECTION 230900 - BASIC MATERIALS AND METHODS

#### PART 1 – GENERAL

# 1.1 DESCRIPTION

A. This section specifies the basic materials and methods to be used in Division 22 and 23.

# 1.2 CUTTING AND PATCHING

A. Any cutting, patching, or filling necessary for the proper execution of this work, except as noted on drawings, shall be done by this contractor.

#### 1.3 INSERTS

A. Furnish and set, in all necessary locations, before or during construction, unistrut inserts for use in connection with the support or placing of piping, ductwork, and equipment furnished under this division of the work.

#### 1.4 SLEEVES AND BOXES

A. <u>Sleeves for Concrete or Masonry Surfaces:</u> For pipes passing thru masonry or concrete construction, provide sleeves at least two pipe sizes larger than the pipe passing thru and made from sections of steel pipe.

#### 1.5 PIPE LOCATION AND ARRANGEMENT

- A. No water supply piping inside the building shall be placed in contact with the earth. Buried water piping shall be placed in Schedule 40 PVC pipe to avoid direct pipe contact with ground.
- B. Unless otherwise noted on the drawings, all water piping shall be kept out of concrete floor slabs and shall be run overhead.
- C. All piping shall be racked and supported to run straight and true. All water piping shall be sloped to drain so that the building may be completely winterized.
- D. Piping shall be racked and run to facilitate maintenance work.
- E. Under no circumstances shall valves, shock absorbers, drip traps, or piping specialties be installed in a "closed space" without proper access provided for future service and maintenance.
- F. Pipes shall not be bent to change direction. Approved fittings must be used.
- G. All valves, piping, and equipment to be installed so as to permit disassembly for maintenance & winter drain down purposes. Provide drain valves at all low points in piping systems. Run to floor drain, where possible, otherwise provide 3/4" hose connection with vacuum breaker.

# 1.6 PIPE GRADING AND SLOPE

A. Piping shall be uniformly graded in direction of flow as follows:

PIPING	FALL/RISE	DIRECTION	PER/RUN
Water	1"	Up	40'
Waste - 4" & smaller	1"	Down	4'
Vent	1"	Up	4'

# PART 2 - PRODUCTS

# 2.1 PIPING SYSTEMS

- A. No foreign made piping will be accepted in this construction.
- B. All piping shall be in accordance with the American Society for Testing and Materials, ASTM A-53.
- C. Culinary cold and hot water above grade shall be Type "L" copper with soldered wrought copper fittings.
- D. Water service and outside water lines shall be Type "K" soft drawn copper with malleable copper fittings.
- E. Water piping below finished floor shall be type "K" soft drawn copper with malleable copper fittings.
- F. All buried waste and vent piping below slabs shall be standard weight DWV schedule 40, solid core PVC ASTM F 1488 piping.
- G. Waste piping above grade shall be standard weight cast iron pipe with no-hub, tyseal, M-G, or A.B.I. 'Best' gasketed fittings for sizes 2" and larger; and galvanized Schedule 40 with tarred Durham drainage fittings for 1-1/2".
- H. All cast iron pipe and fittings, above ground, shall bear the collective trademark of the Cast Iron Soil Pipe Institute, or have prior approval of the engineer.
- I. Exposed piping, fittings, valves, and trim at plumbing fixtures shall be chrome-plated.
- J. Cleanout covers in finished walls shall be chrome finish. Floor covers shall be polished bronze or other, as specified.

# 2.2 HANGERS AND SUPPORTS

# A. Vertical Piping:

- 1. Attachment Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and to carry the weight of the pipe and contents. Stacks shall be supported at their bases.
- 2. PVC soil pipe shall be supported at its base.
- 3. Screwed pipe (IPS) shall be supported at not less than every other story height.
- 4. Copper tubing shall be supported at each story for piping one and one-half (1-1/2) inches in diameter and at not more than six (6) foot intervals for piping one and one-quarter (1-1/4) inches in diameter and smaller.

### B. Horizontal Piping:

- 1. Supports Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
- 2. PVC Soil Pipe Where joints occur, soil pipe shall be supported at not more than 4-foot intervals. Supports shall be placed within eighteen (18) inches of the hub or joint.
- 3. Screwed pipe (IPS) shall be supported at approximately 12-foot intervals.
- 4. Copper tubing shall be supported at approximately 6-foot intervals for piping one and one-half inches and smaller in diameter and at 10-foot intervals for piping two inches and larger in diameter.
- 5. Piping placed underground shall be laid on a firm bed for its entire length.
- 6. Hangers shall be Grinnell Figure 260 for both bare and insulated pipe.
- 7. Where piping is run adjacent to walls or steel columns, it shall be supported from steel brackets or vertical channel hangers. Brackets shall be Grinnell Figure PS 732 or PS 3282 as directed, or approved substitute. Channel systems shall be approved for each condition on an individual basis
- 8. Furnish all hangers, inserts, brackets, anchors, guides, sliding supports, etc., and all auxiliary steel necessary for the installation. All supports shall be designed in accordance with the AISC Steel Handbook.
- 9. Pipe covering protection saddles shall be installed at all pipe hangers which support insulated "hot surface" piping.
- 10. All suspended copper piping shall be securely supported from the building structure at intervals specified and/or as recommended by the pipe manufacturer. Hanger shields shall be functionally similar to isolators with Grinnell Fig. 97 hangers.

# 2.3 VALVES AND STRAINERS

A. All valves and strainers shall be by one manufacturer. Approved valve manufacturers are Crane, Stockham, Jenkins, Walworth, W. C. Norris, or Powell. Crane numbers are used for convenience.

### B. Domestic Hot and Cold Water:

- 1. Check Valves Valves 1-1/2" and smaller shall be Crane No. 37, bronze, screwed, Y-pattern 200# WOG swing check valve. Valves 2" and larger shall be Crane No. 373.
- 2. Ball Valves For hot and cold domestic water service: Valves 2" and smaller shall be Crane No. 2190H, bronze, screwed, 200# WOG, Gem ball valve with Buna-N rubber capsule. Watts B6000 or Apollo 70-100.

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  - 3. Strainers Strainers 1-1/2" and smaller shall be Crane No. 988-1/2, iron body, screwed Y-pattern, 200# WOG, sediment separators with a 20-mesh Monel screen.
  - 4. All strainers shall be installed with fine mesh supplementary 'construction screens' which shall remain in place while the system is flushed and chemically cleaned. The 'construction strainer' basket shall be removed just prior to balancing the water systems.
  - 5. Provide blow-down ball valve on all strainers same size as strainer tapping.

#### 2.4 BACKFLOW PREVENTERS

- A. Backflow preventers shall comply with requirements of the 2018 International Plumbing Code as to type, style, size, location, and arrangement for the actual installed duty.
- B. Where backflow preventers are installed which release water thru the valve to the atmosphere, these units shall be provided with drip pans which collect the free water. The drip pans shall be piped to the nearest drain.
- C. All backflow preventers shall be installed with the necessary isolation valves and test cocks.

#### 2.5 UNIONS

A. Ground joint unions shall be installed on pipe 2-1/2" and under where indicated on drawings. Whenever piping is connected to a major piece of apparatus, unions shall be provided as near as practical on each side of the apparatus.

#### 2.6 ISOLATION FITTINGS

A. Approved isolation fittings shall be installed at the junction of all copper and steel piping to prevent electrolytic action.

#### 2.7 MECHANICAL EQUIPMENT TAGGING

A. All mechanical and plumbing equipment, including fans, water heaters, and other devices shall be identified with signs made of laminated plastic 1/8" or larger engraved letters. Signs shall be securely attached by rustproof screws or some other permanent means (no adhesives).

# PART 3 - EXECUTION

# 3.1 TESTING

A. All piping shall be tested in accordance with Section 230593 prior to applying insulation or concealing in partitions, wall, etc.

#### 3.2 INSTALLATION OF UNDERGROUND PIPING

- A. Coordinate the routing and location of all underground piping with building footings. See structural drawings.
- B. Outside pipe placed underground shall be buried deep enough to protect against freezing.

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C. Depth of bury of services shall be:

Minimum

Sewer 48" Water 60"

#### 3.3 EXCAVATION

- A. Excavation of every description and of whatever substances encountered shall be performed to the lines and grades indicated.
- B. <u>Trench Excavation:</u> The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below and above the top of the pipe shall be sloped, or made vertical, as recommended in the manufacturer's installation manual. The trench width below the top of the pipe shall available, trench walls below the top of the pipe shall be vertical, and trench walls above the top of the pipe shall be sloped as required to properly complete the work. Trench width below the top of the pipe shall not exceed 24 inches plus pipe outside diameter (O.D.). Where recommended trench widths are procedures. The cost of this redesign and the increased cost of the pipe or installation procedures shall be borne by the Contractor without additional cost to the Owner.

# 3.4 BACKFILLING

A. Backfill material shall consist of satisfactory material. Backfill shall be placed in layers not exceeding 4 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density.

#### 3.5 ACCESS

- A. All valves and equipment shall be located to allow easy access for inspection, test and balance, and operation. If valves are installed in inaccessible locations, it shall be this contractor's responsibility to furnish and install access doors of a type approved by the owner's representative.
- B. Locate piping, valves, etc., to allow easy access to and maintenance of equipment. Do not block walkways or tube-pull space in equipment rooms.

# 3.6 SWEAT CONNECTIONS

- A. Copper piping in domestic water service: Piping shall be cut (with a pipe cutter) so ends are square and will "bottom" in fittings. There must be no gaps left thru which solder can run into the line. If a hack saw must be used, it shall be guided with a miter box to insure a square, even cut. Tubing shall be reamed to remove burrs, being careful not to expand tubing while reaming.
- B. The outside of the copper pipe and the inside of the fittings, where solder will be applied, shall be burnished.
- C. A light coat of soldering flux shall be applied to both pipe and fittings. Acid flux shall not be used.
- D. Joints shall be uniformly heated to proper soldering temperature to ensure that solder will flow to all parts of the joint. The solder shall be fed to the joint until a uniform line of solder appears around the pipe at the end of the fittings.

- E. Piping shall be joined with 'Stay-Safe-50' or 'Silvabrite-100' no lead solder.
- F. When valves are being installed, the non-metallic parts shall be removed to prevent the heat of soldering from damaging the valves. No heat shall be applied near where an excessive temperature may cause damage.

#### 3.7 WASTE & VENT PIPING INSTALLATION

- A. Measure and cut PVC pipe to desired length.
- B. Debur and chamfer the end of the pipe removing any ridges or rough edges. If the end is not chamfered, the edge of the pipe may remove the cement from the fitting socket and result in a leaking joint.
- C. Clean and dry the surfaces to be joined.
- D. Test fit the joint and mark the depth of the fitting on the outside of the pipe.
- E. Uniformly apply a liberal coat of primer to inside socket surface of the fitting and the male end of the pipe to the depth of the fitting socket.
- F. Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement shall be applied lightly, but uniformly to inside of socket, take care to keep excess cement out of socket. Apply a second coat to the end of the pipe.
- G. Immediately after applying the last coat of cement to the pipe, and while both inside socket surface and the end of the pipe are wet with cement, forcefully insert the end of the pipe into the socket until it bottoms out. Turn the pipe 1/4 turn during assembly (but not after the pipe is fully inserted) to distribute the cement evenly.
- H. Assembly should be completed within 20 seconds after the last application of cement. Hammer blows should not be used when inserting pipe.
- I. After assembly, wipe excess cement from the pipe at the end of the fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate a defective assembly due to insufficient solvent.
- J. Handle joints carefully until completely set.
- K. Suspend piping a minimum of every four feet using location hangers.

End of section 230900

# SECTION 233000 - AIR DISTRIBUTION

#### PART 1 – GENERAL

#### 1.1 SCOPE

A. Work shall include exhaust, and ventilation duct systems and all materials, equipment, and labor required to complete the systems shown on plans and specified herein.

#### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Construct all ducts, plenums, etc., of the gauges specified in the latest editions of the applicable SMACNA Manuals, unless otherwise shown. Sheets shall be free from blisters, slivers, pits, and imperfectly galvanized spots. All seams shall be hammered and made airtight with duct sealant.
- B. Duct construction details shall comply with the latest edition of the SMACNA "Low Velocity" sheet metal and duct manuals.

#### 2.2 DUCTWORK

- A. Curved elbows shall have centerline radius equal to 1-1/2 times the width of duct. Turning vanes shall be provided at all 45 deg and 90 deg elbows as well as split tee fittings. Vanes shall be single thickness type. Air turns shall be installed in abrupt elbows and shall consist of curved metal blades or vanes with extended trailing edges arranged so as to permit air to make abrupt turn without appreciable turbulence. Air turns shall be quiet and free from vibration when system is in operation.
- B. Sheet metal ducts shall be properly braced and reinforced with galvanized steel angles or other structural members, and where they protrude above roof, they shall be properly flashed. Internal ends of all slip joints shall be installed in direction of flow. Snap lock seams will be permitted on duct gages 22 ga. and lighter.
- C. <u>Dimensions:</u> Ducts, unless otherwise approved, shall conform accurately to the dimensions indicated on the drawings, and shall be straight and smooth on the inside with joints neatly finished. All duct sizes are free area inside dimensions. Acoustically lined ducts shall have outside dimensions increased, as required, to accommodate the acoustic lining specified and still maintain the face area inside dimensions shown on the drawings.
- D. <u>Field Verifications</u>: No ductwork shall be fabricated without first field verifying that the available space under actual job conditions will permit installation of the ductwork without structural or other conflicts.

# 2.3 DUCT JOINTS

A. All duct joints must be sealed airtight as required by Table 1-2 "SEAL CLASSIFICATION" of the "HVAC Duct Construction Manual". The term "seal" or "sealed" means use of mastic or mastic plus tape or gasketing as appropriate.

#### 2.4 WALL PENETRATIONS

A. All ducts penetrating structural or architectural walls shall be sealed air and sound tight.

# 2.5 EXHAUST OUTLETS

- A. Exhaust outlets shall be located at least 10 ft. above the adjoining grade level.
- B. Coordinate exact locations and elevations with architectural elevations.

#### 2.6 EXHAUST FANS

#### A. Ceiling Type:

- 1. Furnish and install complete the ceiling-mounted exhaust fans shown and specified on the drawings.
- 2. Fan shall have acoustically insulated housing for quiet operation. Air deliveries shall be as indicated on the drawings and shall be certified by AMCA performance tests.
- Fan shall have centrifugal wheel direct connected to motor. Ceiling grille shall be all aluminum construction with satin finish. Entire fan, motor, and wheel assembly shall be removable without disturbing the housing. Fan speeds shall not exceed 1100 RPM. Unit shall be complete with backdraft damper.
- 4. Toilet room exhaust fans shall operate with light fixtures, with a 10-minute delay. Coordinate with Division 26.
- 5. Concessions area exhaust fan shall operate from a 0–3-hour wall timer switch with indicating light. Switch to be provided and installed by Division 23.
- 6. Fans shall be Penn, Twin City, Cook, Greenheck, or approved substitute.

#### 2.7 LOUVERS

- A. At all air system openings in outside wall, install storm louvers. Construct louvers of galvanized "paint-lock" sheet metal.
- B. Louvers shall be recessed type and shall course in blocking.
- C. Louvers shall be painted at factory. Provide color sample for review.
- D. Slats shall be inclined at least 45 degrees from the horizontal and overlap a minimum of 1". Slats over 40" long shall have a 2" wide intermediate support. The exterior face of the louver shall be neatly fitted to the building wall, flashed at top, and caulked at sides and bottom. New open area for air passage shall be at least 50% of the nominal size. On the inside face of the louver, install a removable screen, consisting of 1/2" mesh galvanized wire screen in a galvanized channel frame. The louver shall have a painted wall sleeve with flange to cover exposed brick or block surface.
- E. Caulk around louver frames with clear G.E. silicone sealer after installation.
- F. Louvers shall be Airolite, Louvers and Dampers, Air Balance, Air Guide, American Warming, or Dowco.

# PART 3 - EXECUTION

#### 3.1 SURFACE CONDITIONS:

# A. Inspection:

- 1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- 2. Verify that the work of this section may be installed in accordance with all pertinent codes and regulations in the approved shop drawings.

#### B. Discrepancies:

- 1. In the event of discrepancies, immediately notify the Owner.
- 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- 3. Should the contractor proceed with the work without so resolving the discrepancy, he does so on his own responsibility.

#### 3.2 INSTALLATION OF EQUIPMENT

#### A. General:

1. Install all equipment where indicated on the drawings, allowing adequate space for service to all equipment items.

End of section 230000

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#### **SECTION 26 0500 - ELECTRICAL GENERAL PROVISIONS**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Architectural, Structural, Mechanical and other applicable documents are considered a part of the electrical documents insofar as they apply as if referred to in full.

# 1.2 DESCRIPTION OF WORK:

A. The extent of electrical work is indicated on drawings and/or specified in Divisions 26, 27 and 28 sections of the specification. Provide all labor, materials, equipment, supervision and service necessary for a complete electrical system. Work includes, but is not necessarily limited to, the following items.

	<u>ITEM</u>	<u>SECTION</u>
1.	Electrical General Provisions	26 0500
2.	Electrical Submittals O & M Manuals	26 0502
3.	Electrical Connections for Equipment	26 0507
4.	Conductors and Cables	26 0519
5.	Grounding	26 0526
6.	Supporting Devices	26 0529
7.	Conduit Raceway	26 0532
8.	Electrical Boxes and Fittings	26 0533
9.	Electrical Identification	26 0553
10.	Lighting Control Equipment	26 0943
11.	Panelboards	26 2416
12.	Wiring Devices	26 2726
13.	Overcurrent Protective Devices	26 2815
14.	Motor and Circuit Disconnects	26 2816
15.	Scoreboards & Athletic Equipment	26 2819
16.	Demolition	26 4119
17.	Interior and Exterior Building Lighting	26 5100
18.	Structured Cabling Systems	27 1500
19.	Audiovisual Systems	27 4100

- B. Use of standard industry symbols together with the special symbols, notes, and instructions indicated on the drawings describe the work, materials, apparatus and systems required as a portion of this work.
- C. Visit the site during the bidding period to determine existing conditions affecting electrical and other work. All costs arising from site conditions and/or preparation shall be included in the base bid. No additional charges will be allowed due to inadequate site inspection.

# 1.3 **DEFINITION OF TERMS:**

A. The following terms used in Divisions 26, 27 and 28 documents are defined as follows:

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  - 1. "Provide": Means furnish, install and connect, unless otherwise indicated.
  - 2. "Furnish": Means purchase and deliver to project site.
  - 3. "Install": Means to physically install the items in-place.
  - 4. "Connect": Means make final electrical connections for a complete operating piece of equipment.

# 1.4 RELATED SECTIONS:

- A. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
- B. General and Supplementary Conditions: Drawings and general provisions of contract and Division 1 of the Specifications, apply to all Division 26, 27 and 28 sections.

# C. Earthwork:

1. Provide trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, buried cable, in-grade pull boxes, manholes, lighting pole foundations, etc. See Division 31, Sitework, and other portions of Divisions 26, 27 and 28, for material and installation requirements.

#### D. Miscellaneous Metal Work:

1. Provide fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panelboards, distribution boards, switchboards, motor controls centers, etc. See Division 5, Metals for material and installation requirements.

# E. Miscellaneous Lumber and Framing Work:

1. Provide wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment. See Division 6, Rough Carpentry for material and installation requirements.

#### F. Moisture Protection:

 Provide membrane clamps, sheet metal flashing, counter flashing, caulking and sealants as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors and ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor tight. See Division 7, Thermal and Moisture Protection for material and installation requirements.

#### G. Access panels and doors:

1. Provide in walls, ceiling, and floors for access to electrical devices and equipment. See Division 8, Doors and Windows for material and installation requirements.

# H. Painting:

1. Provide surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, poles, surface metal raceways, etc. See Division 9, Finishes for material and installation requirements.

# 1.5 WORK FURNISHED AND INSTALLED UNDER ANOTHER SECTION REQUIRING CONNECTIONS UNDER THIS SECTION:

A. Provide electrical service, make requisite connections and perform operational test. Items furnished and installed under other sections and connected under this section, include but are not limited to the following:

- 1. Electric motors.
- 2. Package mechanical equipment: fans, fan coil units, pumps, boilers, duplex compressors, etc.
- 3. Motorized dampers.
- 4. Fire and smoke dampers
- 5. Duct mounted smoke detectors.
- 6. Electric hardware.
- 7. Systems/Open Office Furniture.
- 8. Electric Chain Hoist.
- 9. Temperature control panels.
- 10. Fire Riser Connections.

# 1.6 ITEMS FURNISHED UNDER ANOTHER DIVISION, BUT INSTALLED AND CONNECTED UNDER THIS DIVISION:

- A. Items furnished under other Divisions, but turned over to Division 26 for installation and final connection include, but are not necessarily limited to, the following:
  - 1. Wall mounted control stations for motorized roll-up doors/grills.
  - 2. Wall mounted control stations for motorized projection screens.
  - 3. Wall mounted control stations for electric chain hoist repair lift.

#### 1.7 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS:

A. Before bidding, Contractor shall familiarize himself with the drawings, specifications and project site. Submit requests for clarification to Architect/Engineer in writing prior to issuance of final addendum. After signing the contract, the Contractor shall meet the intent, purpose, and function of the Contract Documents. Any costs of materials, labor and equipment arising therefrom, to make each system complete and operable, is the responsibility of the Contractor.

#### 1.8 QUALITY ASSURANCE:

- A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies refers to the latest edition of such publications adopted and published prior to submittal of the bid proposed, unless noted otherwise herein. Such codes or standards are considered a part of this specification as though fully repeated herein.
- B. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred as reducing the quality, requirements or extent of the Drawings and Specifications. Perform work in accordance with applicable requirements of all governing codes, rules and regulations including the following minimum standards, whether statutory or not:
  - 1. National Electric Code (NEC).
  - 2. International Building Code (IBC).
  - 3. International Fire Code (IFC).
  - 4. International Mechanical Code (IMC).
- C. Standards: Comply with the following standards where applicable for equipment and materials specified under this Division.
  - 1. UL Underwriters' Laboratories
  - 2. ASTM American Society for Testing Materials

ETL

7.

3.	CBN	Certified Ballast Manufacturers
4	IPCEA	Insulated Power Cable Engineers Association
	NEMA	National Electrical Manufacturer's Association
5.		
6.	ANSI	American National Standards Institute

D. All electrical apparatus furnished under this Section shall conform to (NEMA) standards and the NEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.

**Electrical Testing Laboratories** 

- E. Comply with requirements of State and Local Ordinances. If a conflict occurs between these requirements and the Contract Documents, the most stringent requirements shall govern. The Contractor accepts this responsibility upon submitting his bid, and no extra charge will be allowed after the contract is awarded. This shall not be construed as relieving the Contractor from complying with any requirements of the Contract Documents that may be in excess of the aforementioned requirements, and not contrary to same.
- F. Obtain all permits, inspections, etc. required by authority having jurisdiction. Include all fees in bid. Furnish a certificate of approval to the Owner's Representative from the Inspection Authority at completion of the work.
- G. Employ only qualified craftsmen with at least three years of experience. Workmanship shall be neat, have a good mechanical appearance and conform to best electrical construction practices. Provide a competent superintendent to direct the work at all times. Any person found incompetent shall be discharged from the project and replaced by satisfactory personnel.
- H. Contractor shall have a current state contracting license applicable to type of work to be performed under this contract.
- I. Required Pre-Electrical Construction Meeting with Electrical Engineer: Electrical contractor/representative will be required to attend a pre-electrical construction meeting (approximately 30-60 minutes) with engineering representative in the electrical engineers office prior to electrical construction commencement. This meeting will address any questions on the part of the contractor and the expectations of the Engineer with regard to specifications, plans and site visits for both rough and finish electrical work
- J. AV contractor shall attend the electrical pre-construction meeting per specification 26 0500.
  - 1. Electrical Contractor shall inform the AV Installer of pre-construction meeting. AV Contractor shall be in attendance at the pre-construction meeting.

# 1.9 CONSTRUCTION CHANGE ORDER PROPOSALS

- A. In the event that a submission of a change order is issued by the contractor, the following information will be required to be submitted by the contractor, prior to any consideration by the owner/architect.
  - a. Where project manager or project engineer work is required, the labor cost shall not exceed 2% of the electrical portion of the change order.
  - b. All equipment, including conduit and wire, shall be itemized, identifying unit costs and quantities of equipment. Distributor quotes shall accompany all change order requests. The distributor quotes shall include costs for all equipment including conduit and wire. Lot pricing for equipment is not acceptable.

- c. The general contractor shall review and confirm that the quantity and costs of materials submitted appear reasonable for the scope proposed.
- d. Labor units shall not exceed base NECA #1 standards. No adjustment factors shall be approved.
- e. Any research and labeling time, shall be the responsibility of the electrical contractor and shall not be included in the change order request.
- f. Any costs associated with the purchase of tools or transportation shall be fully itemized for review by architect/owner.
- g. Overtime rates shall only be approved where additional manpower cannot achieve the same result.
- h. Change order form shall follow the following format:
  - i. PCO number
  - ii. Detailed description of work being performed
  - iii. Location on project where work is performed
  - iv. Chosen NECA column
  - v. Identified material:
    - 1. QTY
    - 2. Unit cost
    - 3. Mark up
    - 4. Material total
  - vi. Identified labor:
    - 1. QTY
    - Unit cost
    - 3. Composite labor rate
    - 4. Labor total

#### 1.10 RECORD DRAWINGS:

- A. Maintain, on a daily basis, a complete set of "Record Drawings", reflecting an accurate record of work in accordance with the following:
  - 1. Show the complete routing and location of all feeders rated 100 amps and larger. Locate work buried below grade or under slab, work concealed above ceilings, and work in concealed spaces, dimensionally from fixed structural elements (not partition walls, etc.)
  - 2. Show the complete routing and location of all telecommunications conduits, systems raceways, and empty raceways, 1-1/4" and larger. Locate work buried below grade or under slab, work concealed above ceilings, and work in concealed spaces, dimensionally from fixed structural elements (not partition walls, etc.).
  - 3. Show all changes, deviations, addendum items, change orders, job instructions, etc., that change the work from that shown on the contract documents, including wall relocations, fixtures and device changes, branch circuiting changes, etc. Where locations of boxes, raceways, equipment, etc. are adjusted in the field to fit conditions, but such new locations may not be obvious by referring to the contract document, show new locations on the record drawings.
- B. At the discretion of the Architect/Engineer, the drawings will be reviewed on a periodic basis and used as a pre-requisite for progress payments. This requirement shall not be construed as authorization for the Contractor to make changes in the layout, or work without written authorization for such changes. The "Record Drawings" for daily recording shall consist of a set of blue line prints of the Contract Drawings.
- C. Upon completion of the work, purchase a complete set of electronic drawings. Transfer all "Record" information from the blue line prints to the drawings via the current CAD program that it was written. The Architect/Engineer shall review the drawings and the

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Contractor shall incorporate the resulting comments into the final record drawings. The Contractor shall make two complete copies of the drawings electronically and forward this to the Engineer.

D. Certify the "Record Drawings" for correctness by placing and signing the following certifications of the first sheet of the drawings:

"CERTIFIED CORRECT (3/8" high letters)

Name of General Contractor)		
By:	Date:	
(Name of Electrical Contractor)		
Ву:	Date:	

#### 1.11 GUARANTEE:

A. Ensure that electrical system installed under this contract is in proper working order and in compliance with drawings, specifications, and/or authorized changes. Without additional charge, replace any work or materials that develop defect, except from ordinary wear and tear, within one year from the date of substantial completion. Exception: Incandescent and fluorescent lamps shall be guaranteed for a period of two months from the date of substantial completion.

#### 1.12 OTHER:

A. Right to Hire. "Client" agrees that during the project and for a period of twenty four (24) months following substantial completion that it will not, directly or indirectly, employ or solicit to employ BNA Personnel.

#### PART 2 - PRODUCTS

# 2.1 GENERAL:

A. Products are specified by manufacturer name, description, and/or catalog number. Discrepancies between equipment specified and the intended function of equipment shall be brought to the attention of the Architect/Engineer in writing prior to bidding. Failure to report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specifications, or should he find discrepancies therein, he shall bring this to the attention of the Architect/Engineer who will issue interpretation and/or additional instructions to Bidders before the project is bid.

# 2.2 MANUFACTURERS:

A. Provide products of manufacturers specified. Manufacturers catalog numbers and descriptions establish the quality of product required. Substitutions will be considered if a duplicate written application (2-copies) is at the office of the Architect/Engineer eight (8) working days prior to the day of the bidding. The application shall include the following: 1) A statement certifying that the equipment proposed is equal to that specified; that it has the same electrical and physical characteristics, compatible dimensions, and meets the functional intent of the contract documents; 2) The specified and submittal catalog numbers of the equipment under consideration; 3) A pictorial and specification brochure.

- B. Any conflict arising from the use of substituted equipment shall be the responsibility of the Contractor, who shall bear all costs required to make the equipment comply with the intent of the contract documents.
- C. Samples may be required for non-standard or substituted items before installation during construction. Provide all samples as required.
- D. No materials or apparatus may be substituted after the bid opening except where the equipment specified has been discontinued.
- E. Provide only equipment specified in the Contract Documents or approved by addendum.

#### 2.3 SPARE PARTS:

A. Provide spare parts (fuses, diffusers, lamps, etc.) as specified. Transmit all spare parts to Owner's Representative prior to substantial completion.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION:

- A. Layout electrical work in advance of construction to eliminate unnecessary cutting, drilling, channeling, etc. Where such cutting, drilling, or channeling becomes necessary for proper installation; perform with care. Use skilled mechanics of the trades involved. Repair damage to building and equipment at no additional cost to the contract. Cutting work of other Contractors shall be done only with the consent of that Contractor. Cutting structural members shall not be permitted.
- B. Since the drawings of floor, wall, and ceiling installation are made at small scale; outlets, devices, equipment, etc., are indicated only in their approximate location unless dimensioned. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned, and coordinate such locations with work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings, but refer to the architectural and mechanical shop drawings and project drawings for dimensions as applicable.
- C. Perform for other trades, the electrical wiring and connection for all devices, equipment or apparatus. Consult Architectural, Mechanical, and other applicable drawings, and all applicable shop drawings to avoid switches, outlets, and other equipment from being hidden behind doors, cabinets, counters, heating equipment, etc., or from being located in chalkboards, tackboards, glass panels, etc. Relocate buried electrical devices and/or connections as directed at no additional cost.
- D. Coordinate the location of outlets, devices, connections, and equipment with the supplier of the systems furniture prior to rough-in.
- E. Where conduit, outlets or apparatus are to be encased in concrete, it must be located and secured by a journeyman or foreman present at the point of installation. Check locations of the electrical items before and after concrete and/or masonry installation and relocate displaced items.
- F. Provide block-outs, sleeves, demolition work, etc., required for installation of work specified in this division.

#### 3.2 CLEAN:

- A. Clean up all equipment, conduit, fittings, packing cartons and other debris that is a direct result of the installation of the work of this Division.
- B. Clean fixtures, interiors and exteriors of all equipment, and raceways. Replace all filters in electrical equipment upon request for Substantial Completion.

#### 3.3 POWER OUTAGES:

- A. All power outages required for execution of this work shall occur during non-standard working hours and at the convenience of the Owner. Include all costs for overtime work in bid.
- B. Submit written request at least 7 days in advance of scheduled outage and proceed with outage only after receiving authorization from the Owner's Representative.
- C. Keep all outages to an absolute minimum.

#### 3.4 STORAGE AND PROTECTION OF MATERIALS:

A. Provide storage space for storage of materials and apparatus and assume complete responsibility for all losses due to any cause whatsoever. In no case shall storage interfere with traffic conditions in any public thoroughfare or constitute a hazard to persons in the vicinity. Protect completed work, work underway, and apparatus against loss or damage.

# 3.5 EXCAVATING FOR ELECTRICAL WORK:

- A. General: Locate and protect existing utilities and other underground work in manner that will ensure that no damage or service interruption will result from excavating and backfilling. Perform excavation in a manner that protects walls, footings, and other structural members from being disturbed or damaged in any way. Burial depths must comply with NEC Section 300-5 (or State of Utah requirement, whichever is more stringent), unless noted otherwise on drawings.
- B. Protect persons from injury at excavations, by barricades, warnings and illumination.
- C. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.
- D. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install electrical work on frozen excavation bases or sub-bases.
- E. Do not excavate for electrical work until the work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum. See other sections of specification for additional requirements for excavating.
- F. Store excavated material (temporarily) near excavation, in a manner that will not interfere with or damage excavation or other work. Do not store under trees (within drip line).
- G. Retain excavated material that

#### 3.6 BACKFILL MATERIALS:

- A. For buried conduit or cable (other than below slab-on-grade, or concrete encased) 2" thickness of well graded sand on all side of conduit or cable.
- B. For trench backfill to within 6" of final grade soil material suitable for compacting to required densities.
- C. For top 6" of excavation Top soil.
- D. Backfill excavations in 8" high courses of backfill material, uniformly compacted to the following densities (percent of maximum density, ASTM D 1557), using power-driven hand-operated compaction equipment.

- Lawn/Landscaped Areas: 85 percent for cohesive soils, 95 percent for cohesionless soils.
- 2. Paved Areas, Other than Roadways (90 percent for cohesive soils, 95 percent for cohesionless soils).
- E. Subsidence: Where subsidence is measurable or observable at electrical work excavations during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of the surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

#### 3.7 ROOF PENETRATIONS:

A. Where raceways penetrate roofing or similar structural area, provide appropriate roof jack coordinate with the roofing contractor and the Architect in order to match the vent with the roof construction. The jack shall be sized to fit tightly to raceway for weather-tight seal, and with flange extending a minimum of 9" under roofing in all sides or as required by the roof type of construction. Completely seal opening between inside diameter of roof flashing and outside diameter of penetrating raceways. Coordinate all work with work required under roofing section of specifications.

#### 3.8 FIRE PENETRATION SEALS:

A. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration either before, during or after fire. The fire rating of the penetration seal shall be at least that of the floor, wall or ceiling that it is installed, so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code. Where applicable, provide OZ Type CFSF/I and CAFSF/I fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs, and similar structures. Where applicable, provide 3M CID cast-in device for floor slabs. Where applicable, provide 3M fire barrier sealing penetration system, and/or IPC Flame Safe Fire Stop System, and/or Chase Foam fire stop system, including wall wrap, partitions, caps, and other accessories as required. All materials to comply with UL 1479 (ASTM E-814). Comply with manufacturer's instructions and recommendations for installation of sealing fittings and barrier sealing systems.

#### 3.9 PROJECT FINALIZATION AND START-UP:

- A. Upon completion of equipment and system installation, assemble all equipment Factory Representatives and Subcontractors for system start-up.
- B. Each Representative and Subcontractor shall assist in start-up and check out their respective system and remain at the site until the total system operation is accepted by the Owner's representative.
- C. The Factory Representative and/or System Subcontractor shall give personal instruction on operating and maintenance of their equipment to the Owner's maintenance and/or operation personnel. To certify acceptance of operation and instruction by the Owner's Representative, the contractor shall prepare a written statement as follows:
  - 1. This is to certify that the Factory Representative and System Subcontractor for each of the systems listed below have performed start-up and final check out of their respective systems.
  - 2. The Owner's Representative has received complete and thorough instruction in the operation and maintenance of each system.

SYSTEM FACTORY REPRESENTATIVE

(List systems included) (List name and address of Factory Representative)

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Owner's Representative	Contractor	
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D. Send copy of acceptance to Architect/Engineer.

# 3.10 FINAL REVIEW:

A. At the time of final review, the project foreman shall accompany the reviewing party, and remove coverplates, panel covers and other access panels as requested, to allow review of the entire electrical system.

**END OF SECTION 26 0500** 

#### SECTION 26 0502 - ELECTRICAL SUBMITTALS AND O & M MANUALS

#### **PART 1 – GENERAL**

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to all Division 26, 27 and 28 sections.
- B. Architectural, Structural, Mechanical and other applicable documents are considered a part of the electrical documents insofar as they apply as if referred to in full. Contractor must review the entire set of plans and specifications. Reviewing only the electrical set is not acceptable.
- C. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

#### 1.2 SUBMITTAL REQUIREMENTS:

#### A. GENERAL:

- 1. After the Contract is awarded but prior to ordering, manufacture, or installation of any equipment, prepare complete Submittals including shop drawings, product data, brochures, etc. for materials and equipment as required by each section of the specification.
- Review of Submittals shall not relieve the Contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from the Contract Document's requirements. It shall be clearly understood that the noting of some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Document's shall govern and are not waived, or superseded in any way by the review of the Shop Drawings and Brochures.
- Submittals are reviewed, not approved. Comments made within submittals do not alter the contract documents in any way. The contractor is still responsible, regardless of comments (if any) made within submittals, for complying with drawings and specifications.
- 4. Notify engineer in writing if any of the comments noted in the submittals alter the contract cost. A comment within the submittal process which increases/decreases cost of product is not an authorization to the contractor under any circumstances to proceed.
- 5. Notify engineer of any modifications between contract documents and submittals. It is the responsibility of the contractor to ensure compliance.
- 6. ELECTRONIC SUBMITTAL REQUIREMENTS:
  - a. Provide submittals in Portable Document Format (PDF).
  - b. Documents must be electronically bookmarked and keyword searchable using Adobe Acrobat (<a href="http://www.adobe.com/acrobat">http://www.bluebeam.com</a>) for each relevant section. For example, include electronic bookmarks separating "Light Fixtures" from "Panelboards".

- c. Electronically highlight <u>all options</u> for light fixtures, electrical equipment, etc. Manual highlighting and scanning of the documents is NOT acceptable and will NOT be reviewed.
- d. Provide only completed cutsheets for all fixture and equipment types.
   Blank cutsheets submitted with a schedule are NOT acceptable and will NOT be reviewed.
- e. At the time of submission, the electrical contractor shall provide a complete and comprehensive submission of all required specification sections/shop drawings at the same time. Exceptions may be given, with prior approval, for time-sensitive equipment.
- f. A maximum of one submittal per specification section is allowed. It is NOT acceptable to provide a product by product submittal. Single product by product submittals will NOT be reviewed.

# B. SCHEDULING

#### 1. GENERAL

- A minimum period of two weeks, exclusive of transmittal time, will be required each time Submittals are submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling submittal data.
- b. If the shop drawings are rejected twice, the contractor shall reimburse the engineer the sum of \$1,200.00 for the third review and any additional reviews required prior to commencement of the third review.

# C. QUALITY ASSURANCE

#### 1. PRE-SUBMITTAL PREPARATION

- a. Prior to submission of the Shop Drawings and Project Data, review and certify that they are in compliance with the Contract Documents. Verify all dimensional information to ensure proper clearance for installation of equipment.
- b. Shop drawings requiring the use of electronic documents (floor plans, Lighting plans, fire alarm plans, etc.) shall be requested via a request for information (RFI) through the general contractor. Electronic documents will be provided to the Architect for distribution. No direct vendor requests will be accepted.
- c. Contractor is completely responsible for the content of the submittal

#### 2. SUBMITTAL REQUIREMENTS

- a. Certifications shall be written or in the form of rubber stamp impressions as follows:
  - I hereby certify that this Shop Drawing and/or Brochure has been checked prior to submittal and that it complies in all respects with the requirements of the Contract Drawings and Specifications for this Project.

(Name of Electrical Subcontractor)

Name	
Position	_Date

b. Brochures to be submitted shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information. Brochures submitted shall contain only information relevant to the particular equipment or materials to be furnished. The Contractor shall i.

- not submit catalogs that describe several different items in addition to those items to be used, unless all irrelevant information is marked out, or unless relevant information is clearly marked. Brochures from each manufacturer shall be identified and submitted separately.
- c. Shop Drawings shall be done in an easily legible scale and shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Draftsmen skilled in this type of work. Shop Drawings shall be drawn to at least 1/4" = 1'0" scale.
- d. Observe the following rules when submitting the Shop Drawings and Brochures.
  - Each Shop Drawing shall indicate in the lower right hand corner, and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Architect and Electrical Engineer, Contractor, Subcontractors, Manufacturer, Supplier/Vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included the submittal will be returned for resubmittal.
    - 1. Submittal Identification shall include the following:
      - A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted.
      - b. Original submittal numbers shall have the following format: "XXX-Y;" where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals (for example, A, B, or C being the first, second, and third resubmittals, respectively). Submittal 25B, for example, is the second resubmittal of Submittal 25.
- e. SPECIFICATION section and paragraph to which submittal applies.
- D. POST-SUBMITTAL
  - 1. Check all materials and equipment after arrival on the job site and verify compliance with the Contract Documents.

#### 1.3 PROVIDE SUBMITTALS AS REQUESTED FOR EACH OF THE SECTIONS LISTED BELOW:

- A. 26 0519 Conductors and Cables
  - 1. (600V and Below)
    - a. Submit megohmmeter test data for circuits under 600 volts.
- B. 26 0533 Electrical Boxes and Fittings
  - 1. Submit manufacturer's data including specifications, installation instruction and general recommendations for each type of floor box used on project.
- C. 26 0553 Electrical Identification

- 1. Submit manufacturer's data on each type of electrical identification products
  - a. Submit one sample of each component of the electrical identification system as follows: Wire/cable tape marker, Tags, Engraved, plastic laminate labels, Arc-flash hazard labels

# D. 26 0943 Lighting Control Equipment

- 1. Submit manufacturer's data on lighting control equipment including, but not limited to published catalog data sheets, rough-in diagrams and instructions for installation, operating and maintenance, suitable for inclusion in maintenance manuals.
- 2. Meet with the electrical engineer at their office prior to preparation of shop drawings to discuss and verify specific programming and zoning requirements of system(s).
- 3. Meet with the lighting representative/manufacturer of the approved and accepted lighting control equipment to verify and understand specific installation requirements associated with that system.
- 4. Submit detailed drawings and documentation of lighting control components and interconnection including, but not necessarily limited to:
  - a. Electronic controllers
  - b. Control stations
  - c. Photo sensors
  - d. Occupancy sensors
  - e. Network wiring details
  - f. Input and output wiring details
  - g. Lighting control panel load schedules
  - h. Provide a complete sequencing and programming schedules for all devices, zones and scenes.
  - i. Wallstations layouts
  - j. Accurately scaled equipment layouts, wire/cable routing and connections to control wiring and electrical power feeders.

#### E. 26 2416 Panelboards

- Submit dimensioned drawings of panelboards and enclosures showing accurately scaled layouts of enclosures and required individual panelboard devices, including but not necessarily limited to, circuit breakers, fusible switches, fuses, ground-fault circuit interrupters, and accessories.
- 2. Submit manufacturer data including specifications, installation instructions and general recommendations, for each type of panelboard required.
- Submit manufacturer's data and shop drawings only after completion of the preliminary protective device study (see Section 26 0573 as applicable). Any Section 26 2416 submittals received prior to submission of the preliminary protective device study will be REJECTED.
- F. 26 2726 Wiring Devices
  - 1. Submit manufacturer's data on electrical wiring devices.
- G. 26 2815 Overcurrent Protective Devices

- 1. Submit manufacturer's data on overcurrent protective devices, including catalog cuts, time-current trip characteristic curves, and mounting requirements.
- 2. Submit layout drawings of overcurrent protective devices, with layouts of circuit breakers, including spatial relationships to proximate equipment. Failure to submit said spatial layouts does not relieve contractor of responsibility to verify all required clearances before release of equipment for fabrication.

#### H. 26 2816 Motor and Circuit Disconnects

- 1. Submit manufacturer's data including specifications, installation and general recommendations, for each type of motor and circuit disconnect switch required.
- 2. Submit dimensioned drawings of electrical motor and circuit disconnect switches that have rating of 100 amperes and larger.

#### I. 26 2913 Motor Starters

- 1. Submit manufacturer's data on motor starters.
- 2. Submit dimensioned drawings of motor starters showing accurately scaled equipment layouts.
- 3. After installation is complete, including water and air balancing, measure voltage (L-L and L-N) and full load current of each phase of each motor. Submit report showing field readings of voltage, amperage, service factor, and thermal heater size installed for each motor.

## J. 26 5100 Interior and Exterior Building Lighting

- 1. Submit manufacturer's data on interior and exterior building lighting fixtures.
- 2. Submit dimensioned drawings of lighting fixtures. Submit fixture shop drawings in PDF format with separate sheet for each fixture, assembled in luminaire "type" alphabetical order, with proposed fixture catalog number and accessories clearly indicated on each sheet.
- 3. When applicable submit standard color samples with the shop drawings. If standard colors are not acceptable, a color sample will be provided to the fixture manufacturer. Return of the shop drawings will be delayed until color samples are provided.
- 4. Submit ballast and driver manufacturer cut sheets.
- 5. Submit a list of all lamps used on projects.
  - Stock of all spare items shall be delivered as directed to Owner's storage space. All components shall be labeled to match construction document nomenclature,

#### K. 26 5600 Exterior Area Lighting

1. Submit manufacturer's data on lighting units, including certified dimension drawings of components including, but not necessarily limited to, poles and standards, mast arms, brackets, hardware and fixtures.

#### L. 27 1500 Structured Cabling Systems

1. Provide electronic submittals in Adobe PDF format within one file. Organize pages within submittal to be in the same order as the specification items (for example, racks prior to cabling). Where multiple submittals are provided due to submittal. If three or more reviews are required of the 27-1500 submittals, Contractor shall reimburse the Engineer for \$1,200 before the Engineer will commence the third review. rejections/corrections, upon completing the submittal process with "No Exceptions Taken", provide a consolidated single PDF submittal showing all

products on the project.

- Provide proof of RCDD DIGITAL COPY certification and connectivity manufacturer certification.
- 3. Provide submittals for all racks/cabinets; patch panels, devices, cabling, firestopping solutions, tray, non-continuous cable support devices, grounding equipment, and miscellaneous equipment to be used on project. Where multiple part numbers are listed on a datasheet/cutsheet, highlight or circle applicable part.
- 4. Provide submittals showing complete racking layout in plan and elevation view to scale. Coordinate exact rack layout with Owner Information Technology Representative prior to submittal.
- 5. Provide color samples of all available standard color faceplates to architect.
- 6. Provide proposed labeling scheme for approval by owner/engineer.
- 7. Provide catalog cutsheets of all test equipment that will be used.
- 8. Provide results of all copper and fiber optic cable tests.

# M. 27 4100 Audiovisual Systems

- Project manager to provide written proof, signed and dated, that shop drawings and/or brochure has been checked for accuracy prior to submittal. Shop drawings to comply in all respects with the requirements of the contract drawings and specifications for this project.
- Provide written proof of rough-in coordination between AV integrator and Electrical contractor.
- 3. Provide a complete bill of materials for all components, accessories and hardware to be provided in order to assemble a complete and working system as described within the contract documents.
- 4. Submit manufacturer's data and installation details for all devices, plates, cables and similar equipment. Product data showing multiple options, products and/or models shall be clearly marked identifying the specific options, products and/or models being provided.
- 5. Submit dimensioned drawings for the areas listed below. Include device locations in relationship to power device locations, rough-in requirements and conduit pathways.
  - a. Announcers Booth
- 6. Device wiring layouts for Audio, Video, Control, and power.
- 7. Submit equipment rack elevation diagrams.
- 8. Submit wireless microphone transmission frequencies.
- 9. Provide shop drawings for 27 4116 at the time of original shop drawing submission. Do not order AV equipment from the first submission. 120 days prior to the time of AV equipment installation, provide a second submission of AV equipment only. Provide current equivalent if specified model has been discontinued.
- 10. All touch panel layouts, page logic functions and control system functionality, shall be submitted and approved by the Owner and AV Consultant prior to installation and programming of the control systems. Contractor shall submit the following information at the following stages during the construction of the GUI.

- a. Draft Stage: Draft drawings and/or sketches of; basic layouts, button details, text details and page flip progression. Include control schemes for all applicable devices in system.
- b. Intermediate Stage: Intermediate Touch Panel Menus designed with manufacturer's software. Submit printouts and/or software files for review. Include detailed layouts, extensive control schemes for all controlled components, comprehensive button and text configurations, page flips and pop-up progression. Incorporate any changes or comments from previous stage mentioned above.
- c. Demo Stage: Provide an active Touch Panel and controller to extensively demonstrate the operation of the control system. Demo of system shall be subject for review and considered as a deliverable. Include all revised detailed layouts, extensive control schemes for all controlled components, comprehensive button and text configurations, page flips and pop-up progression. Incorporate any changes or comments from the previous stage mentioned above.
- d. Final Stage: Submit Final Touch Panel Menus designed with manufacturer's software. Submit printouts and software files for review. Include all detailed layouts, all revised control schemes for all controlled components, revised button and text configurations, page flips and popup progression. Include final page configurations for control of system from the touch panel. Incorporate any and all changes or comments from the previous stage mentioned above.

# 1.4 OPERATION & MAINTENANCE MANUALS

- A. Provide operating instruction and maintenance data books for all equipment and materials furnished under this Division.
- B. Submit four copies of operating and maintenance data books for review at least four weeks before final review of the project. Assemble all data in a completely indexed volume or volumes and identify the size, model, and features indicated for each item. The binder (sized to the material) shall be a 2" slide lock unit (Wilson-Jones WLJ36544B). The cover shall be engraved with the job title in 1/2" high letters and the name and address of the Contractor in 1/4" high letters. Provide the same information in 1/8" letters on the spine.
- C. Include complete cleaning and servicing data compiled in clearly and easily understandable form. Show serial numbers of each piece of equipment, complete lists of replacement parts, motor ratings, etc. Each unit shall have its own individual sheet. (Example: If two items of equipment A and D appear on the same sheet, an individual sheet shall be provided for each unit specified).
- D. Include the following information where applicable.
  - 1. Identifying name and mark number.
  - 2. Certified outline Drawings and Shop Drawings.
  - 3. Parts lists.
  - 4. Performance curves and data.
  - 5. Wiring diagrams.
  - 6. Light fixture schedule with the lamps and ballast data used on the project for all fixtures
  - 7. Manufacturer's recommended operating and maintenance instructions.
  - 8. Vendor's name and address for each item.
- E. The engineer will review the manuals and when approved, will forward the manuals on to the architect. If the manuals are rejected twice, the contractor shall reimburse the engineer

the sum of \$1,200.00 for each review afterwards.

- F. Provide high quality video and audio recording for all training sessions. All trainings shall be recorded by utilizing a pro-grade digital camera system. Utilize camera tripod and record audio directly at the presenter. **Smartphone recordings are not allowed.**
- G. Provide Operation and Maintenance Manual information for each section listed below in addition to the general requirements listed above.
  - 1. 26 0943 Lighting Control Equipment
    - a. Record Drawings
      - A complete set of 'as-builts' drawings showing installed wiring, specific interconnections between all equipment, and internal wiring of this equipment shall be included in the operating and maintenance manuals upon complete of the system.
      - ii. Provide a DIGITAL COPY to the owner containing the information specified below. The DIGITAL COPY shall include all information required to allow the Owner to change the schedules themselves. The DIGITAL COPY shall contain a minimum of following:
        - 1. CAD drawing files of 'as-built' lighting control components and point to point connections.
        - 2. General configuration programming.
        - 3. Job specific configuration programming to include schedule.
        - 4. Tutorial file on complete programming of lighting control system.
  - 2. 26 2913 Motor Starters
    - a. After installation is complete, including water and air balancing, measure voltage (L-L and L-N) and full load current of each phase of each motor. Submit report showing field readings of voltage, amperage, service factor, and thermal heater size installed for each motor.
  - 3. 26 5100 Interior and Exterior Building Lighting
    - a. The supply two complete manuals consisting of, as a minimum, general system arrangement, lighting cutsheets, schematic of System components and options, factory test reports, trouble-shooting data, parts lists, preventative maintenance information, and warranty contact information.
  - 4. 27 1500 Structured Cabling Systems
    - a. Test Results and requirements as outlined in Section 27 1500
    - b. Manual shall include all service, installation, programming and warranty, including test results for each cable.
    - c. Provide laminated plans (minimum size 11 x 17) of all telecommunications record drawings (including riser diagrams) in each and every EF, ER and TR.
    - d. Record Drawings
      - i. The Owner shall provide electronic (DWG) format of

telephone/data system drawings that as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

- ii. Provide a complete set of "as built" drawings in paper and electronic (DWG and PDF) formats showing cabinets, racks, patch panels, wiring, specific interconnections between all equipment and internal wiring of equipment within 30 working days of completion. Drawings are to include all labeling information used in denoting equipment used in the installation. Labeling, icons, and drawing conventions used shall be consistent throughout all documentation provided.
- 5. 27 4110 Audiovisual Systems
  - a. Manual Requirements
    - Operating and maintenance manuals shall be submitted prior to testing of system. Manuals shall include all model numbers, service, installation, and programming information.
    - ii. Include all the following information:
      - 1. Warranty
      - 2. Network settings
      - 3. Riser diagrams from Shop drawings
      - 4. Training videos
      - 5. DIGITAL COPY Flash drive with programing source code and software editing programs
  - b. Record Drawings
    - The Owner shall provide electronic (DWG) format of AV System system drawings that as-built construction information can be added to. These documents will be modified by the AV contractor to denote as-built information as defined above and returned to the Owner.
    - ii. Provide a complete set of "as built" drawings in paper and electronic (DWG and PDF) formats showing cabinets, racks, patch panels, wiring, specific interconnections between all equipment and internal wiring of equipment. Drawings are to include all labeling information used in denoting equipment used in the installation. Labeling, icons, and drawing conventions used shall be consistent throughout all documentation provided.

**END 0F SECTION 26 0502** 

#### **SECTION 26 0507 - ELECTRICAL CONNECTIONS FOR EQUIPMENT**

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

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-23 section making reference to electrical connections.

# 1.2 DESCRIPTION OF WORK:

- A. Extent of electrical connection for equipment includes final electrical connection of all equipment having electrical requirements. Make final connections for all owner furnished equipment. See other applicable portions of specification for building temperature control wiring requirements.
- B. Refer to Division-23 sections for motor starters and controls furnished integrally with equipment; not work of this section.
- C. Refer to Division-23 section for control system wiring; not work of this section.
- D. Refer to sections of other Divisions for specific individual equipment power requirements.

#### 1.3 QUALITY ASSURANCE:

- A. NEC COMPLIANCE: Comply with applicable portions of NEC as to type products used and installation of electrical power connections.
- B. UL LABELS: Provide electrical connection products and materials that have been UL-listed and labeled.

#### **PART 2 - PRODUCTS**

#### 2.1 GENERAL:

- A. For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, raceways, conductors, cords, cord caps, wiring devices, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices, terminations, and connections as required. Crimp on or slip-on type splicing materials (insulation displacement type) designed to be used without wire stripping are not acceptable. See Section 26 0532, Conduit Raceways; Section 26 2726 Wiring Devices: and Section 26 0519 Conductors and Cables for additional requirements. Provide final connections for equipment consistent with the following:
  - 1. Permanently installed fixed equipment flexible seal-tite conduit from branch circuit terminal equipment, or raceway; to equipment, control cabinet, terminal junction box or wiring terminals. Totally enclose all wiring in raceway.
  - Movable and/or portable equipment wiring device, cord cap, and multiconductor cord suitable for the equipment and in accordance with NEC requirements (Article 400).
  - 3. Other methods as required by the National Electrical Code and/or as required by special equipment or field conditions.

#### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION OF ELECTRICAL CONNECTIONS:

- A. Make electrical connections in accordance with connector manufacturer's written instructions and with recognized industry practices, and complying with requirements of NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.
- B. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams.
- C. Coordinate installation of electrical connections for equipment with equipment installation work.
- D. Verify all electrical loads (voltage, phase, horse power, full load amperes, number and point of connections, minimum circuit ampacity, etc.) for equipment furnished under other Divisions of this specification, by reviewing respective shop drawings furnished under each division. Meet with each subcontractor furnishing equipment requiring electrical service and review equipment electrical characteristics. Report any variances from electrical characteristics noted on the electrical drawings to Architect before proceeding with rough-work. In summary, it is not in the Electrical Engineers scope to review the shop drawings from other trades/divisions.
- E. Obtain and review the equipment shop drawings to determine particular final connection requirements before rough-in begins for each equipment item.
- F. Refer to basic materials and methods Section 26 0553 Electrical Identification, Conductors, for identification of electrical power supply conductor terminations.

**END OF SECTION 26 0507** 

#### SECTION 26 0519 - CONDUCTORS AND CABLES (600V AND BELOW)

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to conductors and cables specified herein.

#### 1.2 DESCRIPTION OF WORK:

- A. Extent of electrical conductor and electrical cable work is indicated by drawings and schedules.
- B. Types of conductors and cables in this section include the following:
  - 1. Copper Conductors (600V)
  - 2. Aluminum Conductor (600V)
  - 3. 0-10V Class 1 Circuits
- C. Applications for conductors and cables required for project include:
  - Power Distribution
  - Feeders
  - 3. Branch Circuits
  - 4. 0-10V Class 1 Circuits

#### 1.3 RECORDS SUBMITTAL:

A. Submit record in triplicate of megohmmeter readings to Architect/Engineer. Please see paragraphs 3.2A AFTER INSTALLATION TEST FOR CABLE 600 VOLTS AND BELOW for testing requirements.

#### 1.4 QUALITY ASSURANCE:

- A. Comply with NEC as applicable to construction and installation of electrical conductors and cable. Comply with UL standards and provide electrical conductors and cables that have been UL-listed and labeled.
- B. Comply with applicable portions of NEMA/Insulated Cable Engineers Association standards pertaining to materials, construction and testing of conductors and cable.
- C. Comply with applicable portions of ANSI/ASTM and IEEE standards pertaining to construction of conductors and cable.

#### 1.5 SUBMITTALS:

A. Refer to Section 26 0502 for electrical submittal requirements.

#### **PART 2 - PRODUCTS**

#### 2.1 COPPER AND ALUMINUM CONDUCTORS (600V):

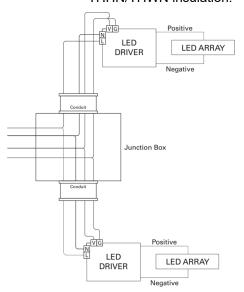
- A. Provide factory-fabricated conductors of sizes, ratings, materials, and types indicated for each service. Where not indicated provide proper selection to comply with project's installation requirements and NEC standards. Provide conductors in accordance with the following:
  - 1. Service Entrance Conductors Copper/Aluminum conductor; see drawings for insulation type.
  - 2. Distribution and Panelboard Feeders; and Other Conductors, #2 AWG and Larger Copper/Aluminum conductor; see drawings for insulation type.
  - 3. Branch Circuit Conductors and All Conductors #3 AWG and Smaller Copper conductor, with THHN/THWN insulation. Size all conductors in accordance with NEC; minimum size to be #12 AWG.
  - Aluminum Conductors. Where aluminum conductors are specified for use, provide compact stranded Aluminum Association 8000- series alloy conductor material.
    - a. Stabiloy Alcan Cable
    - b. Triple E Southwire
- B. Provide connectors and terminations for aluminum-alloy conductors of hydraulic compression type only, listed under UL 486-B, and marked "AL 7CU" for 750 rated circuits, and "AL9CU" for 900 rated circuits.
- C. Provide a maximum of three phase conductors in any one conduit or as approved by electrical engineer. Where phase conductors share a common neutral they must have a means to simultaneously disconnect all ungrounded conductors at the point where the branch circuits originate. The ungrounded and neutral conductors of a multi-wire branch circuit must be grouped together by wire ties at the point of origination.
- D. Provide neutral and ground wire as specified elsewhere in documents.
- E. Provide separate neutral conductor for all single phase branch circuits installed. No shared neutrals are allowed. Neutral conductor shall be the same size as the phase conductor.

# 2.2 COPPER LOW VOLTAGE CONDUCTORS (0-10V CIRCUITS):

- A. 0-10V Class 1 Circuits:
  - 1. General:
    - a. Provide Class 1 circuits for all 0-10V dimming installations. Class 1 circuits shall be permitted to be installed with other circuits as specified in NEC 725.48 (A) and (B):
      - Class 1 circuits shall be permitted to occupy the same cable, cable tray, enclosure, or raceway without regard to whether the individual circuits are alternating or direct current, provided all conductors are insulated for the maximum voltage of any conductors in the cable, cable tray, enclosure or raceway.
      - ii. Class 1 circuits shall be permitted to be installed with

power supply conductors as specified:

- 1. Class 1 and power supply circuits shall be permitted to occupy the same cable, enclosure, or raceway only when functionally associated.
- iii. Utilize purple and grey copper conductors, with THHN/THWN insulation.



#### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION:

- A. General: Install electric conductors and cables as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standards of Installation", and in accordance with recognized industry practices.
- B. Coordinate installation work with electrical raceway and equipment installation work, as necessary for proper interface.
- C. Cables may be pulled by direct attachment to conductors or by use of basket weave pulling grip applied over cables. Attachment to pulling device shall be made through approved swivel connection. Nonmetallic jacketed cables of small size may be pulled directly by conductors by forming them into a loop that pull wires can be attached; remove insulation from conductors before forming the loop. Larger sizes of cable may be pulled by using basket weave pulling grip, provided the pulling force does not exceed limits recommended by manufacturer; if pulling more than one cable, bind them together with friction tape before applying the grip. For long pulls requiring heavy pulling force, use pulling eyes attached to conductors.
- Do not exceed manufacturer's recommendations for maximum allowable pulling tension, side wall pressure, and minimum allowable bending radius. In all cases, pulling tension applied to the conductors shall be limited to 0.008 lbs. per circular mil of conductor cross-section area.
- E. Pull in cable from the end having the sharpest bend; i.e. bend shall be closest to reel. Keep pulling tension to minimum by liberal use of lubricant, and turning of reel, and slack feeding of cable into duct entrance. Employ not less than one man at reel and one in pullhole during this operation.
- F. For training of cables, minimum bend radius to inner surface of cable shall be 12 times

cable diameter.

- G. Where cable is pulled under tension over sheaves, conduit bends, or other curved surfaces, make minimum bend radius 50% greater than specified above for training.
- H. Use only wire and cable pulling compound recommended by the specific cable manufacturer, and that is listed by UL.
- I. Seal all cable ends unless splicing is to be done immediately. Conduit bodies shall not contain splices.
- J. Feeder Splicing may be utilized only where feeders have been upsized for voltage drop. Utilize Polaris Black Insulated type connectors blocks as required. Blocks should be located within switchgear or panelboard as per NEC space allowances. If required provide NEC-sized pull box or gutter box located no further than 12' from final termination at bus, breaker, etc. Label final termination and pull boxes indicating splice and feeder information. Torque conductors per manufacturers recommendations and tape blocks per conductor identification color.
- K. Support all cables in pullholes, concrete trenches, and similar locations by cable racks and secure to rack insulators with nylon cord or self-locking nylon cable ties. Place each cable on separate insulator. In manholes, pullholes, concrete trenches, and similar locations, wrap strips of fire-proofing tape (approx. 1/16 inch thick by 3 inches wide) tightly around each cable spirally in half-lapped wrapping or in two butt-joined wrappings with the second wrapping covering the joints in the first. Apply tape with the coated side toward the cable, and extend tape one inch into the ducts. To prevent unraveling, random wrap the fireproofing tape the entire length of the fireproofing with pressure sensitive glass cloth tape. Provide fireproofing tape of a flexible, conformable fabric having one side coated with flame retardant, flexible, polymeric coating and/or a chlorinated elastomer not less than 0.050 inch thick weighing not less than 2.5 pounds per square yard. Provide tape that is noncorrosive to cable sheath, self-extinguishing, and that will not support combustion. Construct tape of materials that do not deteriorate when subjected to oil, water, gases, salt water, sewage and fungus.
- L. Follow manufacturer's instructions for splicing and cable terminations.

#### 3.2 AFTER INSTALLATION TEST FOR CABLE 600 VOLTS AND BELOW:

- A. Prior to energization, test cable and wire for continuity of circuitry, and for short circuits, Megger all circuits of 100 amp and greater rating. Correct malfunctions. Record all test data and provide written test report.
- B. Subsequent to wire and cable connections, energize circuitry and demonstrate functioning in accordance with requirements.
- **3.3 IDENTIFICATION OF FEEDERS**: Refer to Section 26 0553 for requirements.

**END OF SECTION 26 0519** 

#### **SECTION 26 0526 - GROUNDING**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

#### 1.2 DESCRIPTION OF WORK:

- A. Provide grounding as specified herein, and as indicated on drawings.
- B. Provide grounding and bonding of all electrical and communication apparatus, machinery, appliances, building components, and items required by the NEC to provide a permanent, continuous, low impedance, grounding system.
- C. Unless otherwise indicated, ground the complete electrical installation including the system neutral, metallic conduits and raceways, boxes, fittings, devices, cabinets, and equipment in accordance with all code requirements.
- D. Ground each separately derived system, as described in NEC Section 250-30, unless otherwise indicated.
- E. Types of grounding in this section include the following:
  - 1. Underground Metal Water Piping
  - 2. Metal Building Frames
  - Grounding Electrodes
  - 4. Grounding Rods
  - 5. Service Equipment
  - 6. Enclosures
  - 7. Systems
  - 8. Equipment
  - 9. Other items indicated on drawings
- F. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.

# 1.3 QUALITY ASSURANCE:

- A. Comply with NEC as applicable to electrical grounding and ground fault protection systems. Comply with applicable ANSI and IEEE requirements. Provide products that have been UL listed and labeled.
- B. Resistance from the service entrance ground bus, through the grounding electrode to earth, shall not exceed 10 ohms.

# 1.4 SUBMITTALS:

A. Not Required.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS AND COMPONENTS:

- A. GENERAL: Except as otherwise indicated, provide each electrical grounding system as specified herein, and as shown on drawings, including but not necessarily limited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding jumper braid, and other items and accessories needed for complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.
- B. ELECTRICAL GROUNDING CONDUCTORS: Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC. Provide with green insulation.
- C. GROUND RODS: Steel with copper welded exterior, 3/4" dia. x 10' long. Weaver or Cadweld.
- D. GROUND WELL BOXES FOR GROUND RODS: Precast concrete box 9-1/2" W. x 16" L. X 18" D. with light duty concrete cover for non-traffic areas or rated steel plate for traffic areas. Provide covers with lifting holes. Engrave cover with "GROUND ROD".
- E. CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND): #2/0 AWG bare copper conductor.
- F. INSULATED GROUNDING BUSHINGS: Plated malleable iron body with 150 degree Centigrade molded plastic insulating throat, lay-in grounding lug with hardened stainless steel fasteners, OZ-Gedney BLG, or Thomas & Betts #TIGB series.
- G. CONNECTIONS TO PIPE: For cable to pipe, OZ-Gedney G-100B series or Thomas & Betts #390X series, or Burndy type GAR.
- H. CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS, OR SPLICES: For splicing and/or connecting conductors, use exothermic welds or high pressure compression type connectors. Provide exothermic weld kits manufactured by Cadweld or Thermoweld. If high compression type connectors are used for cable-to-cable, or cable-to-steel, or cable-to-ground rod connections, provide Thomas & Betts #53000 series, or Burndy Hyground series.
- I. BONDING JUMPERS: OZ-Gedney Type BJ, or Thomas & Betts #3840 series, or Burndy type GG and type B braid.
- J. INTERSYSTEM BONDING TERMINAL: Provide one 12" L. x 2" H x ¼" thick copper bus bar. Mount on wall adjacent to Main Electrical Service Equipment on insulating standoffs, 18" A.F.F. Furnish complete with lugs for connecting systems grounding cables. All holes shall be drilled for 2 hole compression lugs. Provide 6 spare lugs. Connect to equipment grounding bus in Main Electrical Service Equipment with No. 4 AWG copper conductor.

#### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION OF GROUNDING SYSTEMS:

- A. Install electrical grounding systems in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding devices comply with requirements.
- B. Install clamp-on connectors only on thoroughly cleaned and metal contact surfaces, to ensure electrical conductivity and circuit integrity.
- C. Provide grounding for the entire raceway, enclosure, equipment and device system in accordance with NEC. All non-metallic raceways shall include copper grounding

- conductor sized in accordance with NEC. Include copper grounding conductor in all raceway installed in suspended slabs.
- D. Provide service entrance grounding by means of ground rods (quantity of two, driven exterior to building), by means of bonding to water main, and by means of bonding to building structural steel. In addition, provide a grounding electrode for not less than 30 lineal feet in concrete footing or foundation that is in direct contract with earth. Size electrode in accordance with NEC, but in no case, smaller than No. 4 AWG bare copper. Support electrode so as to be below finished grade near the bottom of the trench, and approximately three inches from the bottom or sides of the concrete. Locate a point of connection for inspection.
- E. Provide grounding conductors for dimming systems in accordance with manufacturer's requirement.

#### 3.2 GROUNDING ELECTRODES:

- A. Supplementary Grounding Electrode (Ground Ring, Grid, and Driven Rods): Provide driven ground rod(s) installed in listed ground well box(s) and filled with gravel after connection is made. Interconnect ground rod(s) with structural steel and adjacent rods with minimum #4 AWG bare copper conductor. Locate ground rod a minimum of 10 feet from any electrode of another electrical system or from adjacent ground rod(s)].
- B. GROUNDING ELECTRODE CONDUCTOR: Provide grounding electrode conductor sized per NEC table 250-94 or as indicated.
- C. POWER SYSTEM GROUNDING: Connect the following items using NEC sized copper grounding conductors to lugs on the Main Building Ground Bus
  - 1. Grounding electrode conductor from concrete encased electrode, and from ground rods.
  - 2. Conductor from main incoming cold water piping system.
  - 3. Conductor from building structural steel.
  - 4. Ground for separately derived systems.
- D. Run main grounding conductors exposed or in metallic conduit if protection or concealment is required.
- E. EQUIPMENT BONDING/GROUNDING: Provide a NEC sized conductor, whether indicated or not on the drawings, in raceways as follows:
  - 1. Non-metallic conduits and ducts.
  - Distribution feeders.
  - 3. Motor and equipment branch circuits.
  - 4. Device and lighting branch circuits.
  - 5. Provide grounding bushings and bonding jumpers for all conduit terminating in reducing washers, concentric, eccentric or oversized knockouts at panelboards, cabinets and gutters.
- F. Provide bonding jumpers across expansion and deflection couplings in conduit runs, across pipe connections at water meters, and across dielectric couplings in metallic cold water piping system.
- G. Provide bonding wire in all flexible conduit.

#### 3.3 TESTING:

A. Obtain and record ground resistance measurements both from service entrance ground bus to the ground electrode and from the ground electrode to earth. Install additional

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bonding and grounding electrodes as required to comply with resistance limits specified under this Section.

- B. Include typewritten records of measured resistance values in the Operation and Maintenance Manual.
- C. Use independent testing agency for all testing.
- D. Use test equipment expressly designed for the purpose intended. Submit name of testing agency for review and approval, in writing, to the Engineer prior to the performance of any testing.

# **END OF SECTION 26 0526**

#### **SECTION 26 0529**

#### SUPPORTING DEVICES

#### **PART 1 – GENERAL**

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification section, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is a part of each Division-26, 27 and 28 section making reference to supports, anchors, sleeves, and seals, specified herein.

## 1.2 DESCRIPTION OF WORK:

- A. Extent of supports, anchors, and sleeves is indicated by drawings and schedules and/or specified in other Division-26 sections. See Section 260532, Raceways, for additional requirements.
- B. Work of this section includes supports, anchors, sleeves and seals required for a complete raceway support system, including but not limited to: clevis hangers, riser clamps, C-clamps, beam clamps, one and two hole conduit straps, offset conduit clamps, expansion anchors, toggle bolts, threaded rods, U-channel strut systems, threaded rods and all associated accessories.

## 1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical supporting devices. Comply with applicable requirements of ANSI/NEMA Std. Pub No. FB 1, "Fittings and Supports for Conduit and Cable Assemblies". Provide electrical components that are UL-listed and labeled.

#### **PART 2 - PRODUCTS**

## 2.1 MANUFACTURED SUPPORTING DEVICES:

#### A. GENERAL:

1. Provide supporting devices; complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation; and as herein specified. See drawings for additional requirements.

#### **PART 3 - EXECUTION**

## 3.1 INSTALLATION OF SUPPORTING DEVICES:

- A. Install hangers, anchors, sleeves, and seals as required, in accordance with manufacturer's written instructions and with recognized industry practices to ensure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.
- B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.
- C. Install hangers, supports, clamps and attachments to support piping properly from

building structures. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. For pre-and post tensioned construction, use pre-set inserts for support of all electrical work. Do not use toggle bolts, moly bolts, wood plugs or screws in sheetrock or plaster as support for any equipment or raceway.

D. Independent support wires are not allowed as indicated as per NEC 300.11(B).

#### E. RACEWAYS:

1. Support raceways that are rigidly attached to structure at intervals not to exceed 8 feet on center, minimum of two straps per 10 foot length of raceway, and within 12" of each junction box, coupling, outlet or fitting. Support raceway at each 90° degree bend. Support raceway (as it is installed) in accordance with the following:

NUMBER OF RUNS	<u>3/4" TO 1-1/4" 0</u>	1-1/2" & LARGER 0
1 Full straps, clamps or hangers.		Hanger
2	Full straps, clamps or hangers.	Mounting Channel
3 or more	Mounting Channel	Mounting Channel

2. Support suspended raceways on trapeze hanger systems; or individually by means of threaded rod and straps, clamps, or hangers suitable for the application. Do not use "tie wire" as a portion of any raceway support system; do not support raceway from ceiling support wires.

#### F. FLOOR MOUNTED EQUIPMENT:

Provide rigid attachment of all floor mounted equipment to the floor slab or structural system. Provide 5/8" bolts or expansion anchors at each 90 degree corner and at intervals not to exceed 48" on center along entire perimeter of the equipment. Provide rigid attachment for all floor mounted switchboards, panelboards, power and control equipment, motor control centers, dimmer cabinets, transformers (provide neoprene vibrations isolators at anchor points), oil switches, battery packs and racks, and similar equipment furnished under Division 26, 27 and 28.

#### **SECTION 26 0532 - CONDUIT RACEWAY**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to electrical raceways and specified herein.

## 1.2 DESCRIPTION OF WORK:

- A. Extent of raceways is indicated by drawings and schedules.
- B. Division-26 is responsible to provide conduit and rough-in for all thermostat controls located within walls. Coordinate with the Controls Contractor and verify exact location of all thermostats. Obtain and review submittals of Temperature Control Equipment from Controls Contractor and Divisions 21-23.
- C. Types of raceways in this section include the following:
  - 1. Electrical Metallic Tubing
  - Flexible Metal Conduit
  - 3. Intermediate Metal Conduit
  - 4. Liquid-tight Flexible Metal Conduit
  - 5. Rigid Metal Conduit
  - 6. Rigid Non-metallic Conduit

#### 1.3 QUALITY ASSURANCE:

- A. MANUFACTURERS: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than three (3) years.
- B. STANDARDS: Comply with applicable portions of NEMA standards pertaining to raceways. Comply with applicable portions of UL safety standards pertaining to electrical raceway systems; and provide products and components that have been UL-listed and labeled. Comply with NEC requirements as applicable to construction and installation of raceway systems.

## 1.4 SUBMITTALS:

A. Not Required.

#### **PART 2 – PRODUCTS**

## 2.1 METAL CONDUIT AND TUBING:

#### A. GENERAL:

- 1. Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) as indicated; with minimum trade size of 3/4".
- B. RIGID METAL CONDUIT (RMC): FS WW-C-0581 and ANSI C80.1.

- C. INTERMEDIATE STEEL CONDUIT (IMC): FS WW-C-581.
- D. PVC EXTERNALLY COATED RIGID STEEL CONDUIT: ANSI C80.1 and NEMA Std. Pub. No. RN 1.
- E. ALUMINUM CONDUIT: Not acceptable.
- F. ELECTRICAL NON-METALLIC TUBING (ENT) SYSTEM: Not acceptable.
- G. MC CABLE: Only acceptable as indicated below.
  - 1. The use of MC or MC-PCS cable is only acceptable for light fixture whips utilizing 0-10V control schemes, not longer than 72" in length, located above removable grid ceilings. All MC cable shall be provided with anti-short fittings.
    - a. Acceptable Manufacturers
      - i. AFC MC Luminary Cable
      - ii. Encore MC-LED Lighting Cable
      - iii. Southwire MC-PCS Duo

## H. RIGID AND INTERMEDIATE STEEL CONDUIT FITTINGS:

- 1. Provide fully threaded malleable steel couplings; raintight and concrete tight where required by application. Provide double locknuts and metal bushings at all conduit terminations. Install OZ Type B bushings on conduits 1-1/4" and larger.
- I. ELECTRICAL METALLIC TUBING (EMT): FS WW-C-563 and ANSI C80.3.
- J. EMT FITTINGS:
  - Provide insulated throat nylon bushings with non-indenter type malleable steel fittings at all conduit terminations. Install OZ Type B bushings on conduits 1" larger. Cast or indenter type fittings are not acceptable.
- K. FLEXIBLE METAL CONDUIT: FS WW-C-566, of the following type;
  - Zinc-coated steel.
- L. FLEXIBLE METAL CONDUIT FITTINGS: FS W-F-406, Type 1, Class 1, and Style A.
- M. LIQUID TIGHT FLEXIBLE METAL CONDUIT:
  - 1. Provide liquid-tight, flexible metal conduit; constructed of single strip, flexible continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).
- N. LIQUID-TIGHT FLEXIBLE METAL CONDUIT FITTINGS: FS W-F-406, Type 1, Class 3, Style G.
- O. EXPANSION FITTINGS: OZ Type AX, or equivalent to suit application.

#### 2.2 NON-METALLIC CONDUIT AND DUCTS:

- A. GENERAL:
  - 1. Provide non-metallic conduit, ducts and fittings of types, sizes and weights as indicated; with minimum trade size of 3/4".
- B. PVC AND ABS PLASTIC UTILITIES DUCT FITTINGS:
- C. ANSI/NEMA TC 9, match to duct type and material.
- D. HDPE CONDUIT: Not acceptable.

## 2.3 CONDUIT; TUBING; AND DUCT ACCESSORIES:

A. Provide conduit, tubing and duct accessories of types and sizes, and materials, complying with manufacturer's published product information, that mate and match conduit and tubing. Provide manufactured spacers in all duct bank runs.

#### 2.4 SEALING BUSHINGS:

A. Provide OZ Type FSK, WSK, or CSMI as required by application. Provide OZ type CSB internal sealing bushings.

## 2.5 CABLE SUPPORTS:

A. Provide OZ cable supports for vertical risers, type as required by application.

#### **PART 3 - EXECUTION**

## 3.1 INSTALLATION OF ELECTRICAL RACEWAYS:

- A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and in accordance with the following:
  - 1. SERVICE ENTRANCE CONDUCTORS, AND CONDUCTORS OVER 600 VOLTS:
    - a. Install in rigid metal conduit (RMC), or intermediate metal conduit (IMC); except where buried below grade, install in non-metallic conduit or duct, individually encased in concrete. See duct banks.

## 2. FEEDERS UNDER 600 VOLTS:

- a. Install in electric metallic tubing (EMT). Below concrete slab-on-grade or in earth fill, install in non-metallic plastic conduit. In areas exposed to weather, moisture, or physical damage, install in RMC or IMC. In suspended slabs, install in EMT (NOT APPROVED).
- BRANCH CIRCUITS, SIGNAL AND CONTROL CIRCUITS, AND INDIVIDUAL EQUIPMENT CIRCUITS RATED LESS THAN 100 AMPS:
  - a. Install in electric metallic tubing (EMT). Below concrete slab-on-grade or in earth fill, install in non-metallic plastic duct. In areas exposed to weather, moisture, or physical damage, install in RMC or IMC. In suspended slabs, install in EMT (NOT APPROVED).
- B. Coordinate with other work including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.
- C. Install raceway in accordance with the following:
  - Provide a minimum of 12" clearance measured from outside of insulation from flues, steam and hot water piping, etc. Avoid installing raceways in immediate vicinity of boilers and similar heat emitting equipment. Conceal raceways in finished walls, ceilings and floor (other than slab-on-grade), except in mechanical, electrical and/or communication rooms, conceal all conduit and connections to motors, equipment, and surface mounted cabinets unless exposed work is indicated on the drawings. Run concealed conduits in as direct a line as possible with gradual bends. Where conduit is exposed in mechanical spaces, etc., install parallel with or at right angles to building or room structural lines. Do not install lighting raceway until piping and duct work locations have been determined in order to avoid fixtures being obstructed by overhead equipment.

- 2. PVC conduit may be utilized within CMU and Block type walls. At the point exiting or offsetting from wall transition to EMT and metal electrical box as required.
- The required raceway size, for any given installation, shall remain the same throughout the entire length of the run. At no point shall any conduit be reduced in size.
- 4. Where cutting raceway is necessary, remove all inside and outside burrs; make cuts smooth and square with raceway. Paint all field threads (or portions of raceway where corrosion protection has been damaged) with primer and enamel finish coat to match adjacent raceway surface.
- 5. Provide a minimum of 1 ½" from nearest surface of the roof decking to raceway.
- 6. In open gymnasiums, auditoriums, etc; all conduit shall be installed in straight lines parallel to, or at right angles to, the structure or adjacent building elements. Separations between conduits and fastenings of conduits shall be neat and consistent. Conduit shall be installed as tight to the bottom of structural elements when parallel to joists as code will allow. Overall installation shall be accomplished in an aesthetic and workmanlike manner. No conduits shall be allowed to run perpendicular to the bottom chord and at the bottom of the joists.
- 7. Provide conduit from device to device in open and/or exposed ceilings. Ceilings with clouds are considered open/exposed ceiling. No exposed cables shall be seen from below.
- 8. Provide a maximum of three phase conductors in any one conduit or as approved by electrical engineer. Where phase conductors share a common neutral they must have a means to simultaneously disconnect all ungrounded conductors at the point where the branch circuits originate. The ungrounded and neutral conductors of a multi-wire branch circuit must be grouped together by wire ties at the point of origination.
- 9. Provide neutral and ground wire as specified elsewhere in documents.
- 10. Provide separate neutral conductor for all single phase branch circuits installed. No shared neutrals are allowed. Neutral conductor shall be the same size as the phase conductor.
- D. Comply with NEC for requirements for installation of pull boxes in long runs.
- E. Cap open ends of conduits and protect other raceways as required against accumulation of dirt and debris. Pull a mandrel and swab through all conduit before installing conductors. Install a 200 lb. nylon pull cord in each empty conduit run.
- F. Replace all crushed, wrinkled or deformed raceway before installing conductors.
- G. Do not use flame type devices as a heat application to bend PVC conduit. Use a heating device that supplies uniform heat over the entire area without scorching the conduit.
- H. Provide rigid metal conduit (RMC) for all bends greater than 22 degrees in buried conduit. Provide protective coating for RMC bend as specified herein.
- I. Where raceways penetrate building, area ways, manholes or vault walls and floors below grade, install rigid metal conduit (RMC) for a minimum distance of 10 feet on the exterior side of the floor or wall measured from interior face. Provide OZ, Type FSK, WSK or CSMI sealing bushings (with external membrane clamps as applicable) for all conduit penetrations entering walls or slabs below grade. Provide segmented type CSB internal sealing bushings in all raceways penetrating building walls and slabs below grade, and in all above grade raceway penetrations susceptible to moisture migration into building through raceway.
- J. Install liquid-tight flexible conduit for connection of motors, transformers, and other electrical equipment where subject to movement and vibration.

- K. Install spare 3/4" conduits (capped) from each branch panelboard into the ceiling and floor space. Run five into the ceiling space and five into the floor space. Where the floor is not accessible run six conduits into the ceiling space. Run conduits the required distance necessary to reach accessible ceiling space.
- L. Provide OZ expansion fittings on all conduits crossing building expansion joints, both in slab and suspended.
- M. Provide OZ cable supports in all vertical risers in accordance with NEC 300-19; type as required by application.
- N. Complete installation of electrical raceways before starting installation of cables/conductors within raceways.
- O. Raceway installation below grade:
  - 1. Apply protective coating to metallic raceways in direct contact with earth or fill of any type; consisting of spirally wrapped PVC tape (1/2" minimum overlap of scotch wrap tape or equal); or factory applied vinyl cladding (minimum thickness .020 inches). Completely wrap and tape all field joints.
  - 2. Burial depths must comply with NEC Section 300-5 but in no case be less than 24", unless noted otherwise on drawings.
- P. Raceway installation below slab-on-grade, or below grade:
  - 1. For slab-on-grade construction, install runs of rigid plastic conduit (PVC) below slab. All raceway shall be located a at top of sub-grade and a minimum of 6" below bottom of slab. Stake down conduits as required to keep conduits from floating or moving. Coordinate strictly with other trades at grade level structural members for correct installation. Install RMC (with protective coating) for raceways passing vertically through slab-on-grade. Slope raceways as required to drain away from electrical enclosures and to avoid collection of moisture in raceway low points.
  - 2. Apply protective coating to metallic raceways in direct contact with earth or fill of any type; consisting of spirally wrapped PVC tape (1/2" minimum overlap of scotch wrap tape or equal); or factory applied vinyl cladding (minimum thickness .020 inches). Completely wrap and tape all field joints.
  - 3. Mark all buried conduits that do not require concrete encasement by placing yellow plastic marker tape (minimum 6" wide) along entire length of run 12" below final grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16", install a single line marker.
  - 4. Burial depths must comply with NEC Section 300-5 but in no case be less than 24". unless noted otherwise on drawings.
  - 5. Do not locate utility feeds under any structure. Verify all utility power paths with RMP prior to any rough-in. Utility burial depths must comply with RMP requirements or AHJ, but in no case be less than 48" minimum, unless noted otherwise on drawings, diagrams etc.
- Q. Raceway installation in suspended slabs:
  - 1. No conduit can be installed in suspended slabs.
- R. Raceway installation in hazardous locations:
  - 1. Install RMC in all hazardous locations as defined by NEC. Provide suitable fittings, seal-offs, boxes, etc. to comply with requirements.
  - Engage at least five full threads on all fittings. Provide inspection fittings with explosion proof drains to prevent water accumulation in conduit runs. Install sealoffs for arcing or high temperature equipment, at housing with splices or taps and

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where conduits enter or leave the hazardous area. Provide seal-offs of the appropriate type for vertical or horizontal installation. Ground all metallic parts.

S. Electrical Identification: Refer to Section 260553 for requirements.

#### **SECTION 26 0533 - ELECTRICAL BOXES AND FITTINGS**

#### **PART 1 – GENERAL**

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is a part of each Division-26, 27 and 28 section making reference to electrical wiring boxes and fittings specified herein. See Section 260532, Raceways, for additional requirements.

## 1.2 DESCRIPTION OF WORK:

- A. The extent of electrical box and electrical fitting work is indicated by drawings and schedules.
- B. Types of electrical boxes and fittings in this section include the following:
  - Outlet Boxes
  - 2. Junction Boxes
  - Pull Boxes
  - 4. Floor Boxes
  - 5. Conduit Bodies
  - 6. Bushings
  - 7. Locknuts
  - 8. Knockout Closures
  - 9. Miscellaneous Boxes and Fittings

## 1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical boxes and fittings. Comply with ANSI C 134,1 (NEMA Standards Pub No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers and box supports. Provide electrical boxes and fittings that have been UL-listed and labeled.

#### 1.4 SUBMITTALS:

A. Submit manufacturer's data including specifications, installation instruction and general recommendations for each type of floor box used on project.

#### **PART 2 - PRODUCTS**

## 2.1 FABRICATED MATERIALS:

#### A. INTERIOR OUTLET BOXES:

1. Provide one piece, galvanized flat rolled sheet steel interior outlet wiring boxes with accessory rings, of types, shapes and sizes, including box depths, to suit each respective location and installation, construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box and covers and wiring devices; minimum size 4"x4"x2-1/8".

2. Provide an 'FS' box, with no knockouts when surface mounted in a finished, nonutility space. Surface mounting is only acceptable when approved by the Architect.

#### B. INTERIOR OUTLET BOX ACCESSORIES:

1. Provide outlet box accessories as required for each installation, including mounting brackets, hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, that are compatible with outlet boxes being used and fulfilling requirements of individual wiring applications.

#### C. WEATHERPROOF OUTLET BOXES:

1. Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes (including depth) required, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, with face plate gaskets and corrosion-resistant fasteners.

#### D. JUNCTION AND PULL BOXES:

 Provide code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

#### E. CONDUIT BODIES:

1. Provide galvanized cast-metal conduit bodies, of types, shapes and sizes to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws.

## F. BUSHINGS, KNOCKOUT CLOSURES AND LOCKNUTS:

1. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and malleable steel conduit bushings and offset connectors, of types and sizes to suit respective uses and installation.

#### **PART 3 - EXECUTION**

## 3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

#### A. GENERAL:

- Install electrical boxes and fittings where indicated, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- 2. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.
- 3. Provide coverplates for all boxes. See Section 262726, Wiring Devices.
- 4. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.
- Provide knockout closures to cap unused knockout holes where blanks have been removed.
- 6. Install boxes and conduit bodies to ensure ready accessibility of electrical wiring. Do not install boxes above ducts or behind equipment. Install recessed boxes with face of box or ring flush with adjacent surface. Seal between switch, receptacle and other outlet box openings and adjacent surfaces with plaster, grout, or similar suitable material.

- 7. Fasten boxes rigidly to substrates or structural surfaces, or solidly embed electrical boxes in concrete or masonry. Use bar hangers for stud construction. Use of nails for securing boxes is prohibited. Set boxes on opposite sides of common wall with minimum 10" of conduit between them. Set boxes on opposite sides of fire resistant walls with minimum of 24" separation.
- 8. Provide a minimum of 1 ½" from the nearest surface of the roof decking to the installed boxes.
- 9. Provide electrical connections for installed boxes.

## **SECTION 26 0553 - ELECTRICAL IDENTIFICATION**

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

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Requirements of the following Division 26 Sections apply to this section:
  - "Basic Electrical Requirements".
  - 2. "Basic Electrical Materials and Methods".

#### 1.2 SUMMARY

- A. This section includes identification of electrical materials, equipment and installations. It includes requirements for electrical identification components including but not limited to the following:
  - 1. Buried electrical line warnings.
  - 2. Identification labels for raceways, cables and conductors.
  - 3. Operational instruction signs.
  - 4. Warning and caution signs.
  - 5. Equipment labels and signs.
  - 6. Arc-flash hazard labels
- B. Related Sections: The following sections contain requirements that relate to this section:
- C. Division 9 Section "Painting" for related identification requirements.
- D. Refer to other Division 26 sections for additional specific electrical identification associated with specific items.

#### 1.3 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code"

#### 1.4 SUBMITTALS:

1. Refer to Section 26 0502 for electrical submittal requirements.

## **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. American Labelmark Co.
  - 2. Calpico, Inc.
  - Cole-Flex Corp.
  - 4. Emed Co., Inc.
  - 5. George-Ingraham Corp.

- 6. Ideal Industries, Inc.
- 7. Kraftbilt
- 8. LEM Products, Inc.
- 9. Markal Corp
- 10. National Band and Tag Co.
- 11. Panduit Corp.
- 12. Radar Engineers Div., EPIC Corp.
- 13. Seton Name Plate Co.
- 14. Standard Signs, Inc.
- 15. W.H Brady, Co.

## 2.2 ELECTRICAL IDENTIFICATION PRODUCTS

- A. Colored Conduit Systems for raceway identification:
  - 1. Factory-painted conduit and/or factory-painted couplings and fittings
- B. Colored paint for raceway identification:
  - Use Kwal Paint colors as specified in Part 3 Execution.
- C. Color Adhesive Marking Tape for Raceways, Wires and Cables:
  - 1. Self-adhesive vinyl tape not less than 3 mills thick by 1" to 2" in width.
- D. Underground Line Detectable Marking Tape:
  - Permanent, bright colored, continuous-printed, acid- and alkali-resistant plastic tape specifically compounded for direct-burial service. Not less than 6" wide by 4 mills thick.
  - 2. With metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.
  - 3. Printed legend indicative of general type of underground line below.
- E. Wire/Cable Designation Tape Markers:
  - Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letters.
- F. Brass or Aluminum Tags:
  - 1. Metal tags with stamped legend, punched for fastener.
  - 2. Dimensions: 2" X 2" 19 gage.
- G. Engraved, Plastic Laminated Labels, Signs and Instruction Plates:
  - 1. Engraving stock plastic laminate, 1/16" minimum thickness for signs up to 20 sq. in. or 8" in length; 1/8 " thick for larger sizes. Engraved legend in 1/4" high white letters on black face and punched for mechanical fasteners.
- H. Arc-flash Hazard Labels:
  - 1. ANSI Z535.4 Safety Label.
  - Adhesive backed polyester with self-laminating flap. Chemical, abrasion and heat resistant.
  - 3. Dimensions: 5" x 3.5"
  - 4. Information contained: Arc-flash boundary; Voltage; Flash Hazard Category; Incident Energy (arc rating); checkboxes for the required Personal Protective Equipment (PPE) and the date that the calculations were performed.

## I. Equipment Labels:

- Adhesive backed polyester with self-laminating flap. Chemical, abrasion and heat resistant.
- 2. Dimensions: minimum 5" x 2"
- Conductor-Identification-Means Labels:
  - a. Information contained: the method utilized for identifying ungrounded conductors within switchboards, distribution panels and branch circuit panels.
- 4. Available-Fault-Current Labels:
  - a. Information contained: maximum available fault current at the respective piece of equipment, and date of calculation of fault current.
- 5. Source-of-Supply Labels:
  - a. Information contained: indicate the device or equipment where the power supply originates.
- J. Baked Enamel Warning and Caution Signs for Interior Use:
  - 1. Preprinted aluminum signs, punched for fasteners, with colors legend and size appropriate to location.
- K. Fasteners for Plastic-Laminated and Metal Signs:
  - 1. Self-tapping stainless steel screws or # 10/32 stainless steel machine screws with nuts, flat and lock washers.
- L. Cable Ties:
  - 1. Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18" minimum width, 50-lb. Minimum tensile strength, and suitable for a temperature range from minus 40° F. to 185° F. Provide ties for specified colors when used for color coding.

#### **PART 3 - EXECUTION**

## 3.1 INSTALLATION

- A. Lettering and Graphics:
  - Coordinate names, abbreviations, colors and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering and colors as approved in submittals and as required by code.
- B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.
- C. Sequence of Work:
  - 1. Where identification is to be applied to surfaces that require a finish, install identification after completion of finish work.
- D. Conduit Identification:
  - 1. Identify Raceways and cabling jackets of Certain Systems with Color Coding. Acceptable means of color identification are as follows:
    - a. Colored adhesive marking tape.
    - b. Field-painted colored bands.
    - c. Factory-painted conduit.

d. Color exposed or accessible raceways of the following systems for identification. Make each color band 2 inches wide, completely encircling conduit. Apply bands at changes in direction, at penetrations of walls and floors, and at 20-foot maximum intervals in straight runs. Apply the following colors:

i. Fire Alarm System: Red

ii. Desktop Data: Blue

iii. Wireless Acces Points and Projectors: Geen

iv. Intercom: White

v. AV & AV Network: Orange

vi. Access Controls: Yellow

vii. Intrusion: Grey

viii. IP Surveillance: Purple

ix. Legally Required Emergency Systems: Red with Black Stripe (Per NEC 700.10(A))

- 2. Identify Junction, Pull and Connection Boxes.
  - a. Code-required caution sign for boxes shall be pressured-sensitive, self-adhesive label indication system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers on outside of cover with identity of contained circuits. Use pressure-sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.
- 3. Label and paint the covers of the systems junction boxes as follows:

SYSTEM	COLOR (ALL COLORS ARE KWAL PAINT)		
Fire Alarm	Red Alert	AC118R	
Intercom	Flat White		
AV	Fiesta Orange	AC107Y	
Data	Neon Blue	7076A	
WAPs	Java Green	AC098N	
Access Controls	Competition Yellow	7225A	
Intrusion	Grey		
IP Surveillance	Purple		
Legally Required EM System	Red/Black Stripe		

- E. Underground Electrical Line Identification.
  - 1. During trench backfilling, for exterior underground power, signal, and communications lines, install continuous underground line detectable marking tape, located directly above line at 6 to 8 inches below finished grade. Where multiple lines are installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.
  - 2. Install detectable marking tape for all underground wiring, both direct-buried and in raceway.
  - 3. Provide red marker dye applied to concrete encased ductbank.

- F. Conductor Color Coding.
  - 1. Provide color coding for secondary service, feeder and branch circuit conductors throughout the project secondary electrical system as follows:

120/208 Volts	<u>Phase</u>	277/480 Volts
Black	Α	Brown
Red	В	Orange
Blue	С	Yellow
White	Neutral	Gray
Green	Ground	Green

- 2. Switch legs, travelers and other wiring for branch circuits shall be of colors other than those listed above.
- 3. Use conductors with color factory applied the entire length of the conductors except as follows:
  - a. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
  - b. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
  - c. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.
- G. Power Circuit Identification.
  - Securely fasten identifying metal tags or aluminum wraparound marker bands to cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb monofilament line or one-piece self-locking nylon cable ties.
  - 2. Tag or label conductors as follows:
    - Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicting source and circuit numbers.
    - b. Multiple Circuits: Where multiple branch circuits or control wiring or communications/ signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs,

and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

- 3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- H. Apply warning, caution and instruction signs and stencils as follows:
  - Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items. Warning and caution signs shall be furnished and installed on, but not be limited to the following equipment and locations:
    - a. Entrances to rooms and other guarded locations that contain exposed live parts 600 volts or less; signs shall forbid unqualified personnel to enter.
    - b. Switch and Overcurrent device enclosures with splices, taps and feedthrough conductors. Provide warning label on the enclosures that identifies the nearest disconnecting means for any feed-through conductors.
    - Entrances to buildings, vaults, rooms or enclosures containing exposed live parts or exposed conductors operating at over 600 volts: DANGER-HIGH VOLTAGE-KEEP OUT.
    - d. Metal-enclosed switchgear, unit substations, transformers, enclosures, pull boxes, connection boxes and similar equipment operating at over 600 volts shall have appropriate caution signs and warning labels.
    - e. Indoor and Outdoor substations operating over 600 volts. Provide warning signs, instructional signs and single-line diagrams in accordance with NEC 225.70.
- I. Emergency Operating Signs: Install engraved laminated signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.
- J. Install equipment/system circuit/device identification as follows:
  - 1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/4"-high lettering on 1-inch-high label (1 1/2-inch-high where two lines are required) white lettering in black field. White lettering in red field for Emergency Power Systems. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.
    - a. Each service disconnect, to identify it as a service disconnect.
    - b. Panelboards (exterior and interior), electrical cabinets, and enclosures. For subpanels, identify feeder circuit served from.
    - Switches in fusible panelboards shall be labeled. Main switches shall be identified.
    - d. Access doors and panels for concealed electrical items.

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- e. Electrical switchgear and switchboards.
- f. Motor control centers.
- g. Motor starters, including circuit origination, HP, heater size, FLA, and mechanical equipment designation.
- h. Disconnect switches.
- Pushbutton stations.
- j. Power transfer equipment.
- k. Contactors.
- Dimmers.
- m. Control devices.
- n. Transformers.
- o. Power generating units, to include transfer switches.
- p. Telephone switching equipment.
- q. Clock/program master equipment.
- r. Call system master station.
- s. TV/AV equipment.
- t. Fire alarm master station or control panel.
- u. Variable frequency drives.
- v. Lighting Control Equipment.
- w. Uninterruptable Power Supply.
- K. Post Conductor-Identification-Means labels at locations of switchboards, distribution panels and branch circuit panels. The labels shall identify the color-coding used on ungrounded conductors for each voltage system used on the premises.
- L. Apply Available-Fault-Current labels at the service entrance equipment.
- M. Apply Source-of-Supply labels on the exterior covers of equipment (except in single- or two-family dwellings) as follows:
  - 1. Each switchboard supplied by a feeder.
  - 2. Each branch circuit panelboard supplied by a feeder.
  - 3. Each disconnect switch serving elevators, escalators, moving walks, chairlifts, platform lifts and dumbwaiters.
  - 4. Each dry type transformer (or primary-side disconnect switch at transformer). If the primary-side disconnect is remote from the transformer, both the remote disconnect and the transformer shall be labeled, and the transformer label shall also indicate the location of the disconnect.
  - 5. Each feeder disconnect, branch circuit disconnect, panelboard or switchboard in a remote building or structure.
  - 6. Each on-site emergency power source, with sign placed at service entrance equipment to comply with NEC 700.
- N. The label shall identify the device or equipment where the power supply originates, and the system voltage, phase or line and system at all termination, connection and splice points. For example: Feeder Power Supply for Panel "XX" Originates at Panel "XX" (or Switchboard "XX", Transformer "XX", Switch "XX", etc.); 120/208 volts, 3-phase, Phase Color Identification (or 120/240, 277/480, etc.).
- O. Install Arc-flash hazard labels on the following equipment:

- 1. Each piece of service entrance equipment.
- 2. Each power distribution switchboard or panel.
- 3. Each individually mounted circuit breaker.
- 4. Each branch circuit panelboard.
- 5. Each motor control center.
- 6. Each individually mounted motor starter.
- 7. Each meter socket enclosure.
- P. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere.
- Q. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
- R. Engrave all receptacle plates other than those serving 120 volt, single phase devices. State voltage and amperage characteristics: Example; "208V 30A".
- S. Mark each device box (for each type of wiring device) with a permanent ink felt tip marker, indicating the circuit that the device is connected to: Example; "CKT A-1"
- T. Label circuit breaker feeding fire alarm panel "Fire Alarm Circuit". Using plastic laminate label, white lettering on a red background.

#### **SECTION 26 0943 - LIGHTING CONTROL EQUIPMENT**

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

#### 1.2 DESCRIPTION OF WORK:

- A. Extent of lighting control equipment work is indicated by drawings and schedules, and is hereby defined to include, but not by way of limitation, lighting control panels, control stations and other user interface devices, wiring and ancillary equipment.
- B. Types of lighting control equipment specified in this section, includes the following:
  - 1. Occupancy sensors
  - 2. Daylight sensors
  - 3. Wallstations/Switches
  - 4. Lighting Load Controllers (Room Controllers)
  - 5. Emergency Lighting Control Units/Generator Transfer Devices
- C. Requirements are indicated elsewhere in these specifications for work including but not limited to raceways, electrical boxes and fittings required for installation of lighting control equipment, not work of this section.

#### 1.3 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years. To ensure a uniform installation and single responsibility, all switching and dimming equipment described herein shall be supplied by a single manufacturer.
- B. Installer: Qualified with at least 3 years of successful installation experience on projects with lighting control equipment installation work similar to that required for project.
- C. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.
- D. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA Standard regarding the types of electrical equipment enclosure.
- E. Codes and Standards: Provide units that meet the requirements of IEEE Std. 2000.1.1999.
- F. Independent Testing Laboratory: Provide units that have been tested and listed under UL 916 energy management equipment.

G. Component Pre-testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.

#### 1.4 SUBMITTALS:

A. Refer to Section 26 0502 for electrical submittal requirements.

## PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS:

- A. Manufacturer: Subject to compliance with requirements, provide lighting control equipment of one of the following;
  - 1. <u>GreenGate Controls</u>
  - 2. Acuity nLight Controls
  - 3. Douglas Lighting Controls
  - 4. Hubbell Building Automation
  - 5. Lutron Lighting Controls
- B. The lighting controls as shown are based upon GreenGate lighting controls. Prior approval and commitment to being able to provide similar and equal system is required before bidding this project. Any system different from Eaton Controls that requires additional relays, etc. not shown on plans due to lack of separation of relays and dimming zones must be accounted for and provided in the bid and must function as similar to that which is required in final installation.

## 2.2 SYSTEM DESCRIPTION:

- A. The lighting control system shall provide seamless control and monitoring of all lighting included in the scope of work regardless of whether it is relay switched or dimmed.
- B. The lighting control system shall consist of low voltage relay control panels with programmable switch inputs, the panel shall be microprocessor controlled with a touchscreen interface display. The touchscreen shall provide relay status information viewable through a protected windowed enclosure. All local programming shall be permissible through the self-prompting touchscreen.
- C. Programmable intelligence shall include:
  - 1. Time of day control (64 time-of-day/holiday schedules)
  - 2. 32 holiday dates
  - 3. Timed inputs (adjustable from 1 to 99 minutes)
  - 4. Timed override (from touchscreen, adjustable from 1 to 999 minutes, then resumes normal schedule)
  - 5. Pre-set controls
  - 6. Auto daylight savings adjust
  - 7. Low voltage Dimming/Central Dimming Controls:
    - a. 0-10V dimming capability
    - b. Daylighting control via 0-10V dimming relays and programming
    - c. DMX or other dimming protocols as indicated on plans
  - 8. Astronomical clock with offsets

- 9. Local control (from touchscreen and local switch)
- 10. Digital wallstations/switches
- 11. Flash warning of impending off for occupants
- Network override
- D. The controller shall permit lighting to be overridden on for after-hours use or cleaning. The controller shall provide priority and masking choices to allow for customizing the functions of switch inputs, thereby enabling wallstations/switches to function differently at different times of day. These overrides shall be digital, network or hard-wired inputs.
- E. The lighting control system shall be fully programmable through PC programming software. Programming shall be permitted through a direct RS-232 connection, modem or TCP/IP.
  - 1. Shall include with user-friendly software suitable for operation on computer workstations which serve as central control stations for the selection and operation of lighting scenes.
  - 2. All software shall be programed by the vendor and delivered ready to use. This program shall include preparation of all graphics, and displays required as a part of this project.
- F. The control system shall provide networking between lighting control panels. The network shall support up to a maximum of 254 control panels. Panels shall permit data sharing for global controls. All inputs shall be transferable over the network to create any switching pattern.
- G. The lighting control system shall log all control events. Log reports shall be available through the integral touchscreen or enterprise software.
- H. All lighting programing shall meet the requirements of the IECC 2018 or current energy code applied to the project.

#### 2.3 EQUIPMENT:

- A. Room Controllers:
  - 1. The room controller shall provide the following functionality;
    - a. Provide interface with room occupancy sensor to provide lighting and receptacle control and be programmable as either manual on/automatic off. Provide interface with room wallstations to provide multi-level switching and/or variable dimming. Provide interface with daylight sensors to provide daylighting controls of lighting fixture via multi-level (step dimming) and/or variable dimming.
  - 2. The room controller shall be a fully functional lighting control system to match the room lighting and control requirements. The controller shall provide the following features:
    - a. Separate compartments for line voltage, emergency voltage and low voltage connections.
    - b. Breakouts for direct conduit connections.
    - c. Dual voltage (120/277 VAC)
    - d. Low voltage connections using standard RJ-45 connectors.

- e. Zero cross circuitry for each load.
- f. Relay and 0-10V dimming zone configuration to match room requirements.
- g. The ability to be independently program or be re-programmed on site and without the need to replace or send the device to the manufacturer for re-programming.
- 3. Emergency Lighting: When the room controller is provided with emergency relay, the controller shall be UL 924 Listed and monitor the normal power circuit. The UL 924 relay will track the normal power operation. Upon loss of normal power the emergency lighting will be forced on to full bright (if dimming) until normal power is restored. The following features shall be included:
  - a. 120/277 VAC
  - b. Push-to-test
- 4. Daylight sensors shall work with the room controller to provide automatic daylight dimming capabilities for loads connected to the room controller. The daylight sensor shall include the following features:
  - a. An additional photodiode that measures only the visible spectrum.
  - b. The sensor shall have three light level ranges;
    - i. Low (3-300 LUX), high (30-3000 LUX) and direct sun (300-30,000 LUX).
  - c. The sensor shall provide the capability of controlling multiple (up to three) daylight zones for dimming daylight harvesting.
  - d. The sensor shall include an internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.
- 5. Ceiling Mounted Occupancy Sensors: Sensors shall utilize dual-technology (ultrasonic and infrared technologies) and have the following additional features:
  - a. Sensor shall be class 2, low voltage; capable of mounting in the ceiling for maximum coverage.
  - b. Sensor shall have automatic self-adjustment algorithm that adjusts timer and sensitivity settings to maximize performance and minimize energy usage.
  - c. Sensor shall have 360 degree field of view.
  - d. Sensor shall incorporate non-volatile memory such that all settings and parameters are saved in protected memory.
  - e. Sensor shall have time delays from 10 to 30 minutes.
  - Sensor shall provide a visual means of indication that motion is being detected via an LED.
  - g. Sensors shall have readily accessible, user adjustable settings for time delay and sensitivity.
  - h. Provide internal additional isolated relay with NO, NC and common outputs for use with HVAC control, data logging and other control options.
- 6. Wallstations: Provide low voltage push-button type switches up to 8 button configurations to match requirements of lighting control within the room. Provide factory engraved labeling for individual push buttons. Provide in a color to match wiring devices and coverplates to match devices and plates in Wiring Devices (Section 26 2726). Wallstation shall connect to the room controller via the room

controller local network. Wallstations that require user interface to allow for raise/lower control of dimming, loads shall include a slider function or similar. All wallstations shall have the ability to be independently program or be reprogrammed on site and without the need to replace or send the device to the manufacturer for re-programming.

- B. Emergency Power Control (CEPC)/ Emergency Lighting Control Units (ELCU)/Generator Transfer Devices (Required when not built into Room Controller, Relay Panel, etc):
  - 1. The Emergency Power Control (CEPC)/Lighting Control Unit (ELCU) shall provide all required functionality to allow any standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building. The unit shall be installed flush to the ceiling so that test switch & LED's are in plain view of room occupants as required by some local electrical codes.
  - 2. The device shall automatically illuminate connected emergency loads upon utility power interruption, regardless of room switch position. (NEC 700.24)
  - 3. Local room switch or lighting control shall turn both regular & emergency luminaires on at the same time (no dedicated emergency room switch required).
  - 4. The emergency lighting control unit shall allow control of emergency lighting fixtures in tandem with normal lighting in an area while ensuring that emergency lighting will turn on immediately to full brightness upon loss of normal power supplying the control device. Emergency lighting operation shall be independent for each controlled area and shall not require a generalized power failure for proper operation.
  - 5. The unit shall be compatible with 2-wire, 3-wire, 0-10V, & DALI dimming systems & ballasts.
  - 6. The device shall be self-contained, measure 1.70" x 2.97" x 1.64," and provide integral one half inch pip nipple mount with snap in locking feature for mounting into a standard junction box KO.
  - 7. The device shall have normally closed dry contacts capable of switching 20 amp emergency ballast loads @ 120-277 VAC, 60 Hz, or 10 amp tungsten loads @ 120 VAC, 60 Hz.
  - 8. The device shall have universal rated voltage inputs provided for normal power sense and normal switched power at 120-277 VAC, 60 Hz.
  - 9. The device shall have an integral momentary test switch. Pressing and holding this switch shall instantly force the unit into emergency mode and turn on emergency lighting. Releasing the test switch shall immediately return the unit to normal operation.
  - 10. The unit shall provide dedicated leads and 24 VDC source for connection to remote test switch, fire alarm system, or other external system capable of providing a normally closed dry contact closure. Breaking contact between the terminals shall force and hold the emergency lighting on until the terminals are

again closed. An integral LED indicator shall indicate the unit's current remote activation status.

- 11. The device shall provide separate LEDs to indicate the presence of normal and emergency power sources. The LEDs shall indicate the unit's current operational mode (normal or emergency).
- 12. The device's normal power input lead shall be connected to the line side of the control device such that any upstream fault causing a loss of power, including the tripping of the branch circuit breaker, will force the unit into the emergency mode and turn on the emergency lighting.
- 13. The unit shall automatically switch emergency lighting on and off as normal lighting is switched. When normal power is not available, the unit shall force and hold emergency lighting on regardless of the state of any external control device until normal power is restored.
- 14. The unit shall utilize zero crossing circuitry to protect relay contacts from the damaging effects of inrush current generated by switching electronic ballast loads.
- 15. The unit shall have UL 94-V0 or UL 94-5VA flame rating & be approved for installation above the suspended ceiling.
- 16. To ensure quality and reliability, the unit shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%.
- 17. The device shall not generate any objectionable electrical or mechanical noise.
- 18. The unit shall be UL and cUL listed and labeled for connection to both normal and emergency lighting power sources.
- C. Interface and Accessories (Classroom Touch Screen and Shade Controller Interface):
  - Provide serial data interface that connects to the room controllers local network to a third-party system for coordinated control of devices including lighting controls, AV equipment (Touch Screen and Processor), shade controls and user interfaces by either system.
    - a. Provide manufacturer capable communication devices capable of communicating via standard protocols RS-232, RS-485 and Ethernet (Preferred Method).
  - 2. Program shades, per owner's requirements, to operate in accordance with the defined lighting presets within the space.

#### **PART 3 - EXECUTION:**

## 3.1 INSTALLATION OF LIGHTING CONTROL EQUIPMENT:

- A. Install lighting control system components and ancillary equipment as indicated, in accordance with equipment manufacturers written instructions, and with recognized industry practices, to ensure that lighting control equipment complies with requirements.
- B. Comply with Requirements of NEC, and applicable portions of NECA's 'Standard of Installation' pertaining to general electrical installation practices.
- C. Coordinate with other electrical work, including raceways, electrical boxes and fittings, as necessary to interface installation of lighting control equipment work with other work.
- D. Electrical Identification: Refer to Section 26 0553 for requirements.

### 3.2 FIELD QUALITY CONTROL:

- A. Upon completion of installation and after circuitry has been energized, demonstrate capability and compliance of system with requirements.
- B. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

#### 3.3 PRODUCT SUPPORT AND SERVICES:

- A. System Start-Up: Provide a factory authorized technician to verify the installation, test the system, and train the owner on proper operation and maintenance of the system. Before requesting start-up services, the installing contractor shall verify that:
  - 1. The control system has been fully installed in accordance with manufacturer's installation instructions.
  - 2. Low voltage wiring for overrides and sensors is completed.
  - 3. Accurate 'as-built' load schedules have been prepared for each lighting control panel.
  - 4. Proper notification of the impending start-up has been provided to the owner's representative.
  - 5. Programming of all wallstations/switches, relays, groups of relays and interfaces with building automation shall be completed by factory authorized technician, prior to final and training.
- B. Factory support: Factory telephone support shall be available at no cost to the owner during the warranty period. Factory assistance shall consist of assistance in solving programming or other application issues pertaining to the control equipment. The factory shall provide a toll free number for technical support.

## 3.4 PROGRAMMING:

A. Program of all lighting control systems as directed by the electrical engineer and/or owner. Meet with the electrical engineer at their office prior to preparation of shop drawings to discuss specific programming and zoning requirements of system(s). Each networked or standalone system shall be programmed to revert back to its normal "ON" position one hour after selecting a scene or raising or lowering a lighting zone.

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- B. All lighting programing shall meet the requirements of the IECC 2018 or current energy code applied to the project.
- C. Integrate lighting controls into classroom or room AV touch Screen and Shade Controller. Provide interface as required. Coordinate with AV integrator to integrate with Touch Panel and GUI within the room. Lighting shall provide multiple presets and slider control options.
  - 1. Sensors can be used to trigger automated settings for shades and projector screens based on room occupancy, ambient light level, etc.
  - 2. Program lighting and shades, per owner's requirements, to operate in accordance with the defined lighting presets within the space.

#### 3.5 COMMISSIONING:

- A. A lighting control system requires at least one site visit for proper commissioning. If multiple site visits are required, the first ensures that the contractor is trained to install the system correctly. On the second, the factory trained engineer will start up the system, ensure that it is operating according to specification, and perform initial programming. The third visit is for the purposes of refining the programming, and training the owner/end user on the system.
- B. Provide factory-certified field service engineer to ensure proper system installation and operation under following parameters:
  - 1. Certified by the equipment manufacturer on the system installed.
  - Site visit activities:
    - a. Verify connection of power feeds and load circuits.
    - b. Verify connection of controls.
    - c. Verify system operation control by control, circuit by circuit.
    - d. Obtain sign-off on system functions.
    - e. Demonstrate system capabilities, operation and maintenance and educate Owner's representative on the foregoing.
  - 3. At least three site visits to accomplish the following tasks:
    - a. Prior to wiring:
      - i. Review and provide installer with instructions to correct any errors in the following areas:
        - 1. Low voltage wiring requirements
        - 2. Separation of high and low voltage wiring runs
        - 3. Wire labeling

- 4. Load schedule information
- 5. Switching cabinet locations and installation
- Physical locations and network addresses of controls
- 7. Ethernet connectivity
- 8. Computer-to-network connections
- 9. Load circuit wiring
- 10. Connections to other systems and equipment
- 11. Placement and adjustment of Occupancy Sensors
- 12. Placement and adjustment of Photocells
- b. After system installation:
  - i. Check and approve or provide correction instructions on the following:
    - 1. Connections of power feeds and load circuits
    - 2. Connections and locations of controls
    - 3. Connections of low voltage inputs
    - 4. Connections of the data network
  - ii. Turn on system control processor and upload any preprogrammed system configuration
  - iii. Verify cabinet address(es)
  - iv. Upload pre-programmed system configuration and information to switching and/or dimming cabinets
  - v. Check load currents and remove bypass jumpers
  - vi. Verify that each system control is operating to specification
  - vii. Verify that each system circuit is operational according to specification
  - viii. Verify that manufacturers' interfacing equipment is operating to specification
  - ix. Verify that any computers and software supplied by the manufacturer are performing to specifications

- x. Verify that any remote WAN (Wide Area Network) connections are operating properly
- xi. Have an owner's representative sign off on the abovelisted system functions
- c. Before project completion and hand-off:
  - i. Demonstrate system capabilities and functions to owner's representative
  - ii. Train owner's representative on the proper operation, adjustment, and maintenance of the system.
- C. Notification: Upon completion of the installation, the contractor shall notify the manufacturer that the system is ready for formal checkout. Notification shall be given in writing a minimum of 21 days prior to the time factory-trained personnel are required on site. Each field installed RJ45 connection must be tested prior to system interconnection. A test report must be furnished to manufacturer prior to scheduling commissioning activity. Manufacturer shall have the option to waive formal turn-on.
- D. Turn-On: Upon completion of all line, load and interconnection wiring, and after all fixtures are installed and lamped, Manufacturer's Certified Technician shall completely check the installation prior to energizing the system. Each installed relay system shall be tested for proper ON/OFF operations, and proper LED illumination. Each installed control cabinet shall be tested verifying that each controlled load adjusts to the selected setting and that all switch LED's illuminate properly.
- E. Provide written commissioning report including space/room names and numbers indicating list of all lighting equipment and devices tested and verifying proper operation of the system. Report shall include corrections, programming information/file, warranties, and owner's representative sign off on the above-listed system functions
- F. At the time of checkout and testing, the owner's representative shall be thoroughly instructed in the proper operation of the system.

#### 3.6 RETRO-COMMISSIONING:

A. During the one year warranty period, provide retro-commissioning services at three month, six month, nine month, and one year marks. Provide at least 4 hours of commissioning service for each of the four retro-commissioning periods. This will include meeting with the Owner to receive feedback on the system and making changes to the system including programming, task tuning.

#### 3.7 MAINTENANCE:

- A. Enable the end user to order new equipment for system expansion, replacements, and spare parts.
- B. Make new replacement parts available for a minimum of ten years from the date of manufacture.
- C. Manufacturing shall provide telephone technical support by factory personnel 24 hours a day, 7 days a week. Project cost overruns and delays can occur without this service. Answering services can add to frustration and delay the resolution of any problems or

issues. Manufacturers who do not offer factory-direct technical support on a 24/7 basis should not be acceptable on this project.

- D. Provide factory-direct technical support hotline 24 hours per day, 7 days per week.
- E. Offer renewable annual service contracts, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

#### 3.8 WARRANTY:

A. Manufacturer shall provide a one (1) year limited warranty on lighting control system. A ten (10) year limited warranty shall be provided on the lighting control relays.

#### 3.9 AS-BUILT DRAWINGS:

- A. A complete set of 'as-builts' drawings showing installed wiring, specific interconnections between all equipment, and internal wiring of this equipment shall be included in the operating and maintenance manuals upon complete of the system.
- B. Provide a CD or USB storage (media) device to the owner containing the information specified below. The media shall include all information required to allow the Owner to change the schedules themselves. The media shall contain a minimum of following:
  - CAD drawing files of 'as-built' lighting control components and point to point connections.
  - 2. General configuration programming.
  - 3. Job specific configuration programming to include schedule.
  - 4. Tutorial file on complete programming of lighting control system.

#### 3.10 TRAINING:

- A. Provide four (4) hours of video taped training in two 2 hour sessions on the operation and use of the lighting control equipment, at job site, at no cost to the Owner.
- B. Provide a CD or USB device to the owner containing the information specified below. The media shall include all information required to allow the Owner to change the schedules themselves. The media shall contain a minimum of following:
  - CAD drawing files of 'as-built' lighting control components and point to point connections.
  - 2. General configuration programming.
  - 3. Job specific configuration programming to include schedule.
- C. Tutorial file on complete programming of lighting control system

#### **SECTION 26 2416 - PANELBOARDS**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to panelboards specified herein.

#### 1.2 DESCRIPTION OF WORK:

- A. The extent of panelboard and enclosure work, is indicated by drawings and schedules.
- B. Types of panelboards and enclosures in this section include lighting and appliance panelboards, and power distribution panelboards.

#### 1.3 QUALITY ASSURANCE:

A. Provide units that have been UL listed and labeled. Comply with NEC as applicable to installation of panelboards, cabinets, and cutout boxes. Comply with NEC pertaining to installation of wiring and equipment in hazardous locations. Comply with NEMA Stds. Pub No. 250, "Enclosures for Electrical Equipment (1000 volt maximum). Pub No. 1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

## 1.4 SUBMITTALS:

A. Refer to Section 260502 for electrical submittal requirements.

#### **PART 2 - PRODUCTS**

## 2.1 ACCEPTABLE MANUFACTURERS:

- A. Subject to compliance with requirements, provide of one of the following:
  - 1. Siemens Energy & Automation, Inc. (Existing Brand/System On-site)
  - 2. Square D Company
  - 3. Cutler Hammer Products, Eaton Corp.
  - 4. GE/ABB

#### 2.2 PANELBOARDS:

#### A. GENERAL:

 Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated. Equip with number of unit panelboard devices as required for complete installation. Fully equip "spaces" with hardware to receive breaker or switch of size indicated. Provide CU/AL rated lugs of proper size to accommodate conductors specified.

#### B. POWER DISTRIBUTION PANELBOARDS:

1. Provide dead-front safety type power distribution panelboards as indicated, with switching and protective devices in quantities, ratings, types and with arrangement shown. Equip with aluminum bus bars, full-sized neutral bus and ground bus. Provide fusible or circuit breaker branch and main devices as

indicated. Series rated systems are not acceptable. See Section 262815, Overcurrent Protection Devices.

## C. LIGHTING AND APPLIANCE PANELBOARDS:

 Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, types, and arrangement shown. Provide bolt-on thermal magnetic type branch breakers. Where multiple breakers are indicated, provide with common trip handle. Series rated systems are not acceptable. Equip with aluminum bus bars, full-sized neutral bus, and ground bus.

#### D. PANELBOARD ENCLOSURES:

- 1. Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gage minimum 16-gage thickness. Provide door-in-door hinged fronts. Provide fronts with adjustable indicating trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges and door swings as indicated. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor. Provide enclosures fabricated by same manufacturer as overcurrent devices contained therein Bolt engraved plastic laminate labels indicating panel name and voltage on the interior and exterior of panelboards.
- 2. Provide floor to ceiling panel extensions for all surface mounted panels located outside of mechanical and electrical rooms.

#### E. FINISH:

 Coat interior and exterior of surface with manufacturer's standard color; baked on enamel finish.

#### F. ELECTRICAL IDENTIFICATION:

1. Refer to Section 260553 for requirements.

#### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION OF PANELBOARDS:

#### A. GENERAL:

- Install panelboards and enclosures where indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", in compliance with recognized industry practices to ensure products fulfill requirements.
- 2. Provide a surge protective device on each panelboard located on the emergency distribution system. Refer to section 26 4313 for requirements.

#### B. MOUNTING:

- 1. Provide 4" high concrete curb under floor standing distribution panelboards.
- Coordinate installation of panelboards and enclosures with cable and raceway installation work. Anchor enclosures firmly to walls and structural surfaces, ensuring they are permanently and mechanically secure. Arrange conductors neatly within enclosure, and secure with suitable nylon ties. Fill out panelboard's circuit directory card upon completion of installation work. Utilize actual final building room numbers, not architectural numbers used on drawings. Identify individual lighting circuits and individual receptacle circuits by room served. Label circuit breakers to identify location of subpanel or equipment supplied using room numbers and equipment names. Include room number with equipment circuit designations. All directories to be typewritten.

# **Ogden High School Baseball Field Renovation**Ogden School District

MHTN Project No. 2022539 Construction Documents - 18 August 2022

#### **SECTION 26 2726 - WIRING DEVICES**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to wiring devices specified herein.

## 1.2 DESCRIPTION OF WORK:

- A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems that are intended to carry but not utilize electric energy.
- B. Types of electrical wiring devices in this section include the following:
  - 1. Receptacles
  - 2. Switches
  - 3. Timer Switches
  - 4. 0-10V & ELV LED LAMP DIMMERS
  - Cord caps
  - 6. Cord connectors

## 1.3 QUALITY ASSURANCE:

A. Comply with NEC and NEMA standards as applicable to construction and installation of electrical wiring devices. Provide electrical wiring devices that have been UL listed and labeled.

#### 1.4 SUBMITTALS:

A. Refer to Section 260502 for electrical submittal requirements.

## **PART 2 - PRODUCTS**

## 2.1 FABRICATED WIRING DEVICES:

## A. GENERAL:

- 1. Provide factory-fabricated wiring devices, in types, and electrical ratings for applications indicated and complying with NEMA Stds. Pub No. WD 1.
- B. Provide wiring devices (of proper voltage rating) as follows:

	<u>RECEPTACLE</u>	<u>SWITCHES</u>			
<u>MFGR</u>		1-POLE	3-WAY	4-WAY	W-PILOT
Hubbell	BR20XTR	HBL 1221	HBL 1223	HBL 1224	HBL 1221-PL
Bryant		1221	1223	1224	1221-PL

Pass Seymour	TR63X	20AC1	20AC3	20AC4	20AC1-RPL
Leviton	TWR20-X	1221	1223	1224	
Cooper	TR5362	1221	1273	1224	1221-PL

- C. Provide devices in colors selected by Architect. Provide red devices on all emergency circuits.
- D. SURGE PROTECTIVE (SPD) RECEPTACLES:
  - 1. Provide SPD receptacles having 4 series parallel 130V MOV's capable of a minimum of 140 joules suppression. Provide units with visual (and audible) surge status indicators to monitor condition of surge circuit; visual indicator to be "on" when power present and suppression circuit is fully functional. (Audible indicator shall sound a "beep" alarm approximately every 30 seconds if suppression circuit has been damaged.) Provide NEMA 5-20R, 20 amp, 125V receptacle of one of the following manufacturers:

	<u>MANUFACTURER</u>	
SPECIFICATION GRADE	<u>HUBBELL</u>	PASS SEYMOUR
Duplex Recept-Visual only	5350	5352 XXXSP
Duplex Recept-Visual/Audible	5352	5362 XXXSP
Single Recept-Visual only	5351	N/A
Duplex Recept-Isol Gnd, Visual/Audible	IG5352S	IG5362 XXXSP
Single Recept-Isol Gnd, Visual only	IG5351S	N/A
HOSPITAL GRADE	<u>HUBBELL</u>	PASS SEYMOUR
Duplex Recept-Visual/Audible	8300HS	8300 XXXSP
Single Recept-Visual only	8310HS	N/A
Duplex Recept-Isol Gnd, Visual/Audible	IG8300HS	IG8300 XXXSP
Single Recept-Isol Gnd, Visual only	IG8310HS	N/A

- 2. Provide (1) SPD receptacle in all Flat Panel Display Wall Boxes ('DP' symbol)
- Color of devices selected by Architect. Provide red devices on all emergency circuits.

#### E. GROUND-FAULT INTERRUPTER:

- Provide general-duty, duplex receptacle, ground-fault circuit interrupters; feed-thru types, capable of protecting connected downstream receptacles on single circuit; grounding type UL-rated Class A, Group A, 20-amperes rating; 120-volts, 60 Hz; with solid-state ground-fault sensing and signaling; with 5 milliamperes ground-fault trip level; color as selected by Architect. Provide Hospital grade where required elsewhere by specification or drawings. Provide units of one of the following:
  - a. P&S/Sierra
  - b. Hubbell
  - c. Leviton

d. Square D

#### F. USB RECEPTACLE

- 1. Provide duplex receptacle with two (2) USB 3.0 amps, 5VDC, 2.0 Type A charging ports.
- 2. Provide products of one of the following:
  - a. Bryant USB20-X
  - b. Cooper TR7736-X
  - c. Hubbell USB20X2-X
  - d. Legrand TR5362USB-X
  - e. Leviton T5832-X

#### G. TAMPER RESISTANT RECEPTACLES:

- 1. Provide tamper resistant receptacles throughout the entire project.
- 2. Provide products of one of the following:
  - a. Leviton-TWR20-X
  - b. Hubbell BR20XTR
  - c. Pass Seymour TR63X
  - d. Cooper TR5362

#### H. WEATHER-RESISTANT RECEPTACLES

- 1. Provide weather-resistant receptacles in outdoor locations such as under roofed open porches, canopies, marquees, etc.
- 2. Provide products of one of the following:
  - a. Pass & Seymour 2095TRWRXXX.
  - b. Hubbell GFTR20XX

## I. CORD CAPS AND CONNECTORS:

- 1. Provide 3, 4 and 5-wire grounding, cap plugs, and connectors of ampere and voltage rating required, for final equipment, and as indicated otherwise on drawings.
- 2. Provide products of one of the following:
  - a. Cooper
  - b. General Electric
  - c. Hubbell
  - d. Leviton
  - e. P&S

## J. TIMER SWITCH:

- Provide a timer switch with the following features and functionalities. Provide switch that mounts in a standard wall box. Provide a Decora style cover plate that matches the other switches on the project. Provide color of switch chosen by Architect.
  - a. Provide Digital time switches that automatically turn lights off after a preset time. User programmable wall switch for astronomical and scheduled control. Electroluminescent back-lit LCD shows timer countdown. Compatible with all electronic ballasts, ELV, MLV, LED, and motor loads.
    - i. Wattstopper TS-400: 120/277VAC; 50/60 Hz
    - ii. Greengate
  - b. Provide Astronomical time switches that automatically turns lighting or other loads on and off according to user programming. Time-out settings range shall range from 5 minutes to 12 hours for flexibility. Electroluminescent back-lit LCD shows timer countdown. Compatible with all electronic ballasts, ELV, MLV, LED, and motor loads. Program schedule per the owner's requirements.
    - i. Wattstopper RT-200: 120/277VAC; 50/60 Hz

# K. 0-10V & ELV LED LAMP DIMMERS:

- Provide single-pole, semi-conductor modular type 0-10V control for 0-10V fluorescent ballasts/LED drivers & 3-wire fluorescent ballast/LED driver dimmers for fixtures; 60 hertz, with wattage and voltage as indicated, continuously adjustable slider control, and with electromagnetic filters to reduce noise and interference to minimum. Construct with continuously adjustable trim potentiometer for adjustment of low end dimming. Dimmer shall match lamp/ballast combination. Color as selected by Architect. Provide devices manufactured by one of the following:
  - a. Pass & Seymour (Titan Series)
  - b. Lutron (Nova Series)
  - c. Lutron (Diva Series)

# 2.2 WIRING DEVICE ACCESSORIES:

- A. WALL PLATES:
  - 1. Provide stainless steel cover plates in all finished areas. Provide galvanized steel plates in unfinished areas. Provide blank coverplates for all empty outlet boxes.
- B. WEATHER-PROTECTING DEVICE ENCLOSURES:
  - 1. Where required for compliance with NEC 406-8 (receptacles installed outdoors for use other than with portable tools or equipment), provide weather-tight device covers that provide complete protection with the cord and cap inserted into the wiring device. Provide units that mount on either single or double gang devices.
  - 2. Provide products of one of the following extra-duty low-profile expandable in-use weatherproof covers for exterior mounted installations:
    - a. Intermatic:

	i.	WP7000W	Single-Gang/White Cover
	ii.	WP7000G	Single-Gang/Gray Cover
	iii.	WP7000BR	Single-Gang/Brown Cover
	iv.	WP7200W	Double-Gang/White Cover
	V.	WP7200G	Double-Gang/Gray Cover
	vi.	WP7200BR	Double-Gang/Brown Cover
b.	TayMac:		
	i.	ML500W	Single-Gang/White Cover
	ii.	ML500G	Single-Gang/Gray Cover
	iii.	ML500Z	Double-Gang/Brown Cover
	iv.	ML2500G	Single-Gang/Gray Cover

- c. Color chosen by architect.
- 3. Provide products of one of the following for roof mounted installations:
  - a. Intermatic WP1020 or WP1030
  - b. P&S WIUC10C or WIUC20c

## **PART 3 - EXECUTION**

## 3.1 GENERAL

- A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work. Install devices in boxes such that front of device is flush and square with coverplate. Drawings are small scale and, unless dimensioned, indicate approximate locations only of outlets, devices, equipment, etc. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinate with other work. Verify all dimensioned items on job site. Consult architectural cabinet, millwork, and equipment shop drawings before beginning rough-in of electrical work. Adjust locations of all electrical outlets as required to accommodate work in area, and to avoid conflicts with wainscoat, back splash, tackboards, and other items.
- C. Where stranded conductors have been utilized, provide solid pigtails to terminate at device.
- D. Provide receptacles in surface raceway at 12" on center unless indicated otherwise.
- E. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.
- F. Install blank plates on all boxes without devices.
- G. Delay installation of wiring devices until wiring work and painting is completed. Provide separate neutral conductor from panel to each GFI receptacle.
- H. Install GFI receptacles for all receptacles installed in the following locations:
  - 1. Restrooms, locker rooms, kitchens, within 6 feet of any sink, or when serving

vending machines and electric drinking fountains.

- 2. Indoor wet locations, non-dwelling garages, elevator rooms and pits.
- 3. Outdoors, and on rooftops.
- 4. Dwelling unit garages, crawlspaces and unfinished basements, accessory buildings, boathouses, and receptacles for boat hoists.
- 5. Label all receptacles (non-GFI), protected downstream of a GFI receptacle or protected by GFI circuit breaker, with an indication that it is protected.
- I. Where light switches or wall box dimmers are specified, provide a separate neutral for each phase of the branch circuits that switches or dimmers are connected.
- J. Electrical Identification: Refer to Section 260553 for requirements.

# 3.2 PROTECTION OF WALL PLATES AND RECEPTACLES:

A. At time of substantial completion, replace those items, that have been damaged, including those stained, burned and scored.

# 3.3 GROUNDING:

A. Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.

# 3.4 TESTING:

A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.

## **END OF SECTION 26 2726**

#### **SECTION 26 2815 - OVERCURRENT PROTECTIVE DEVICES**

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to overcurrent protective devices specified herein.

#### 1.2 DESCRIPTION OF WORK:

- A. Extent of overcurrent protective device work is indicated by drawings and schedules and specified herein. Overcurrent protective devices specified herein are for installation as individual components in separate enclosures; and for installation as integral components of switchboard and panelboards. See Section 262413, Switchgear and Switchboards, and Section 262416, Panelboards.
- B. Contractor shall verify type and cost of all overcurrent protective devices required within existing gear and panelboards. Contractor shall include the necessary cost to provide devices within their bid.
- C. Types of overcurrent protective devices in this section include the following for operation at 600 Volts and below:
  - 1. Molded case thermal circuit breakers
- D. Refer to other Division-26 sections for cable/wire and connector work required in conjunction with overcurrent protective devices.

# 1.3 QUALITY ASSURANCE

- A. Comply with NEC requirements and NEMA and ANSI standards as applicable to construction and installation of overcurrent devices.
- **1.4** SUBMITTALS: Refer to Section 26 0503 for requirements.

## **PART 2 - PRODUCTS**

# 2.1 ACCEPTABLE MANUFACTURERS:

- A. Subject to compliance with requirements, provide products of one of the following (main and branch device manufacturer must be same as panelboard and/or switchboard manufacturer):
- B. PROVIDE CIRCUIT BREAKERS WITHIN NEW AND EXISTING GEAR:
  - 1. Square D Company (Existing Brand/System On-site)
  - 2. Siemens Energy & Automation, Inc.
  - 3. Cutler Hammer Products, Eaton Corp.
  - GE/ABB
- C. MOLDED CASE THERMAL TRIP CIRCUIT BREAKERS:

- Provide factory-assembled, molded case circuit breaker for power distribution panelboards and switchboards; and for individual mounting, as indicated. Provide breakers of amperage, voltage, and RMS interrupting rating shown, with permanent thermal trip and adjustable instantaneous magnetic trip in each pole. Series rated systems are not acceptable. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated, of proper size to accommodate conductors specified.
- Circuit breakers 15 amps through 599 amps shall be molded case thermal trip circuit breakers.

## **PART 3 - EXECUTION**

#### 3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES:

- A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with work as necessary to interface installations of overcurrent protective devices with other work.
- C. Install fuses in overcurrent protective devices. For motor circuits, fuse sizes shown on drawings are for general guidance only. Size fuses in accordance with fuse manufacturer's recommendation for given motor nameplate ampere rating. Test operation. If nuisance tripping occurs, increase fuse size and disconnect device (if necessary) as required to provide nuisance free tripping. Adjust fuse size properly for ambient temperature, frequent starting and stopping of motor loads, and for loads with long start times. Include all costs in bid.
- D. Electrical Identification: Refer to Section 260553 for requirements.

# 3.2 FIELD QUALITY CONTROL

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

## **END OF SECTION 26 2815**

# **SECTION 26 2816 - MOTOR AND CIRCUIT DISCONNECTS**

## **PART 1 – GENERAL**

# 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to motor and circuit disconnect switches specified herein.

# 1.2 DESCRIPTION OF WORK:

A. Extent of motor and circuit disconnect switch work is indicated by drawings and schedule. Work includes complete installations and electrical connections.

# 1.3 QUALITY ASSURANCE:

A. Provide motor and circuit disconnect switches which have been UL listed and labeled. Comply with applicable requirements of NEMA Standards Pub. No. KS 1, and NEC.

# 1.4 SUBMITTALS:

- A. PRODUCT DATA: Submit manufacturer's data including specifications, installation and general recommendations, for each type of motor and circuit disconnect switch required.
- B. SHOP DRAWINGS: Submit dimensioned drawings of electrical motor and circuit disconnect switches which have rating of 100 amperes and larger.

# PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS:

- A. MANUFACTURER: Subject to compliance with requirements, provide products of one of the following (for each type of switch):
  - 1. General Electric Company
  - 2. Square D Company
  - 3. Siemens Energy & Automation, Inc.
  - 1. Cutler Hammer Products, Eaton Corp

# 2.2 FABRICATED SWITCHES:

- A. GENERAL: Provide disconnect and safety switches as indicated herein. Provide:
  - 1. General duty switches on 240 Volt rated circuits.
  - 2. Heavy duty switches on 480 volt rated circuits.
  - HP rated switches on all motor circuits.
- B. GENERAL DUTY SWITCHES: Provide general-duty type, sheet-steel enclosed switches, fusible or non-fusible as indicated of types, sizes and electrical characteristics

indicated; rated 240 volts, 60 hertz; incorporating spring assisted, quick-make, quick-break mechanisms. Provide single phase or three phase and with solid neutral as required by application. Equip with operating handle which is capable of being padlocked in OFF position. Provide NEMA 1 or NEMA 3R as required by application, unless noted. Provide fusible switches with Class R rejection fuse clip kits.

- C. HEAVY-DUTY SWITCHES: Provide heavy-duty type, sheet-steel enclosed safety switches, fusible or non-fusible as indicated, of types, sizes and electrical characteristics indicated; rated 600 volts, 60 hertz; incorporating quick-make, quick-break type mechanisms. Provide single phase or 3 phase, and with solid neutral as required by application, Equip with operating handle which is capable of being padlocked in OFF position. Provide NEMA 1 or NEMA 3R as required by application unless noted. Provide fusible switches with Class R rejection fuse clip kits.
- D. FUSES: Provide fuses for switches, as required of classes, types and ratings needed to fulfill electrical requirements for service indicated. Provide spare fuses amounting to one spare fuse for each 10 installed but not less than three of any one type and size. See Section 262815 Overcurrent Protective Devices for fuse types.

# **PART 3 - EXECUTION**

# 3.1 INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES:

- A. Install motor and circuit disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation" and in accordance with recognized industry practices to ensure that products fulfill requirements.
- B. Coordinate motor and circuit disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.
- C. Install disconnect switches used with motor driven appliances, and motors and controllers within sight of controller position.
- D. For disconnect switches serving motors controlled by variable frequency drives, provide late-make, early-break auxiliary contacts on each disconnect switch. Provide Heavy-Duty switch. Wire auxiliary contact to VFD safety contact, such that disconnecting the motor will shut down the drive first, and closing the switch will start the drive only after power is applied to the motor.
- E. For disconnect switches serving elevators with auxiliary power hydraulic units, provide auxiliary contacts on each disconnect switch. Wire auxiliary contact to auxiliary power such that disconnecting the motor will disconnect the auxiliary power.

#### **END OF SECTION 26 2816**

# SECTION 26 2819 - SCOREBOARDS & ATHLETIC EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

#### 1.2 DESCRIPTION OF WORK:

A. Coordinate location of scoreboards is indicated by architectural, landscape drawings and schedules.

## 1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of scoreboard components and accessories. Provide scoreboard components which are UL-listed and labeled.

#### **PART 2 - PRODUCTS**

#### 2.1 SCOREBOARDS & ATHLETIC DEPARTMENT EQUIPMENT:

A. Provide a complete raceway and wiring system for relocating the existing Daktronics BA-2030 scoreboards, including but not limited to, separate raceways for power and control wiring, cabinets, and miscellaneous items as required.

## **PART 3 - EXECUTION**

# 3.1 INSTALLATION OF SCOREBOARDS & ATHLETIC FIELD EQUIPMENT:

- A. Install scoreboard and athletic field equipment conduit as indicated, in accordance with equipment manufacturer's written instructions and complying with applicable portions of NEC and NECA's "Standard of Installation".
- B. See drawings for special instructions regarding installation of scoreboard conduit.

# 3.2 INSTALLATION OF BASIC WIRING SYSTEM MATERIALS:

A. Provide branch circuit and control wiring, raceways, and electrical boxes and fittings in accordance with Division-26 Basic Materials and Methods sections, "Raceways", "Wires and Cables", and "Electrical Boxes and Fittings".

# **END OF SECTION 26 2819**

# **SECTION 26 4119 - DEMOLITION**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Special Provisions, Division 1 and Division-2 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to demolition.

# 1.2 DESCRIPTION OF WORK:

- A. Extent of major items of demolition work is indicated by drawings. Other demolition work shall be performed as required to maintain system operation.
- B. The intent of the drawings is to indicate major items affected and not to show every device, outlet, fixture, etc. affected by demolition work.
- C. The drawings do not necessarily reflect as-built conditions. The contractor shall visit the jobsite prior to bidding to determine the overall scope of demolition work.
- D. Refer to sections of other Divisions for applicable requirements affecting demolition work.
- E. Refer to Section 260500 for requirements with regard to power outages affecting the operation of existing electrical systems.

# 1.3 QUALITY ASSURANCE:

#### A. NEC COMPLIANCE:

1. Comply with applicable portions of NEC as to methods used for demolition work.

# PART 2 - PRODUCTS (NOT USED)

#### **PART 3 - EXECUTION**

## 3.1 GENERAL:

A. Demolition work shall be laid out in advance to eliminate unnecessary cutting, drilling, channeling, etc. Where such cutting, drilling, or channeling becomes necessary, perform with care, use skilled mechanics of the trades involved. Repair damage to building and equipment. Cutting work of other Contractors shall be done only with the consent of that Contractor. Cutting of structural members shall not be permitted.

#### 3.2 PATCHING AND REPAIR

- A. The Contractor is responsible for all demolition, patching and repair of all finished interior surfaces pertaining to the installation of this particular phase of work. All surfaces shall be finished (painted, etc.) to match the adjacent materials, finishes and colors.
- B. Hard surfaces: Whenever demolition or excavation is required for the installation of the electrical system, it shall be the responsibility of this contractor to make repairs and/or replacements of hard finish surfaces such as concrete, asphalt, roofing, etc.
- C. The method of patching and repair shall follow good construction practices and all finished surfaces shall match materials and finish wherein the demolition occurred.

# 3.3 EXISTING EQUIPMENT

A. The following is a part of this project and all costs pertaining thereto shall be included in

the base bid.

- B. The new electrical equipment and apparatus shall be coordinated and connected into the existing system as required. Auxiliary systems shall comply, unless otherwise specified.
- C. The existing electrical devices, conduit and/or equipment that for any reason obstructs construction shall be relocated. Provide conduit, wiring, junction boxes, etc. as required to extend existing circuits and systems to relocated devices or equipment.
- D. The new fixtures indicated for existing outlets shall be installed in accordance with the fixture specifications.
- E. When installing equipment in the existing building, it shall be concealed.
- F. All existing electrical equipment and systems in portions of the building not being remodeled shall be kept operational, in service and in working condition throughout the entire construction period. Restore any circuits and systems interrupted. Provide temporary panels, temporary wiring and conduit, etc. as required.
- G. Maintain circuit integrity and continuity of all existing circuits and systems that interfere with or are interrupted by remodel work unless those circuits are to be abandoned completely. Maintain all circuits and systems in operation during construction. Provide temporary panels, temporary wiring and conduit, etc. as required.
- H. Existing raceways may be used where possible in place, except as noted. All circuits, conduit and wire that are not used in the remodeled area shall be removed back to the panelboard, where it shall be labeled a spare with circuit number indicated. Re-used raceway shall meet all requirements for new installations.
- I. The existing light fixtures that are not used in the remodeled area shall be carefully removed, and turned over to the owner or properly disposed of. Those fixtures indicated for re-use shall be thoroughly cleaned, repaired as required, re-lamped and installed as indicated.
- J. Move and adjust existing lighting as required for demolition and construction.
- K. Obtain permission from the Architect and Owner's representative before penetrating any ceiling, floor, and wall surfaces.
- L. Any and all equipment having electrical connections that require disconnecting and reconnection at the same or another location throughout the course of construction shall be included as part of this contract.

# **END OF SECTION 26 4119**

# **SECTION 26 5100 - INTERIOR AND EXTERIOR BUILDING LIGHTING**

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

#### 1.2 DESCRIPTION OF WORK:

- A. Types of lighting fixtures in this section are indicated by schedule and include the following:
  - 1. LED (Light Emitting Diode)

# 1.3 QUALITY ASSURANCE:

- A. Comply with NEC, NEMA and ANSI 132,1 as applicable to installation and construction of lighting fixtures. Provide lighting fixtures that have been UL-listed and labeled.
- B. Components and fixtures shall be listed and approved for the intended use by a National Recognized Testing Laboratory (NRTL) including: UL, ETL, and CSA or equivalent
- C. All led products shall comply with the latest version of Illuminating Engineer Society (IES) publications LM-79 and LM-80.

## 1.4 SUBMITTALS:

A. Refer to Section 260502 for electrical submittal requirements.

# PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS:

- A. Subject to compliance with requirements, provide products of one of the following (for each type of fixture):
  - 1. LED:
    - a. Cree
    - b. Nichia
    - c. Samsung
    - d. Philips Lumiled
    - e. Osram
    - f. Xicato

# 2.2 INTERIOR AND EXTERIOR LIGHTING FIXTURES:

# A. GENERAL:

1. Provide lighting fixtures, of sizes, types and ratings indicated complete with, but not necessarily limited to, housings, lamps, lamp holders, reflectors, ballasts,

LED drivers, starters, and wiring. Label each fixture with manufacturer's name and catalog number. Provide all enclosed fixtures with positive latch mechanisms; spring tension clips not acceptable. Provide all exterior fixtures with damp or wet location label as required by application.

#### B. SUPPORT REQUIREMENTS:

1. Provide all pendant and stem hung fixtures with flexible ball joint hangers at all points of support. Equip hooks used to hang fixtures with safety latches. Provide all detachable fixture parts, luminous ceiling accessories, louvers, diffusers, lenses, and reflectors with locking catches, screws, safety chain, or safety cable.

# C. LIGHT EMITTING DIODE (LED) LUMINAIRES:

- 1. LED luminaires that can be serviced in place shall have a disconnecting means internal to the luminaries to disconnect simultaneously from the source of supply all conductors of the driver, including the grounded conductor. Disconnects shall not be required under the following exceptions:
  - a. Luminaries located in hazardous locations.
  - b. Luminaries used for egress lighting.
  - c. Cord-and-plug luminaries.
  - d. In industrial establishments with restricted public access where conditions of maintenance and supervision ensure that only qualified persons service the installation.
  - e. Where more than one luminaire is installed in a space and where disconnecting the supply conductors to the luminaire will not leave the space in total darkness.
  - f. Provide LED luminaires which are tested in accordance with IES LM-79, diodes tested in accordance with IES LM-80, and provide a minimum R9 rating of ≥ 50 (unless specified differently), a CRI rating of ≥ than 80 and L70 (6K) = 50,000 hours (IES TM-21). Provide with 0-10V dimming drivers as standard.
  - g. The fixture manufacturer(s) shall warrant the luminaires, in their entirety, to be free from defects in material or workmanship for at least 5 years from date of manufacture. Provide warranty in accordance with other sections of this specification and include a certificate of warranty from the fixture manufacturer with extended warranty information and proper forms and procedure description.

# D. DIFFUSERS:

1. Where plastic diffusers are specified, provide 100 percent virgin acrylic compound; minimum thickness, .125 inches.

# **PART 3 - EXECUTION**

# 3.1 INSTALLATION OF LIGHTING FIXTURES

- A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standards of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
- B. Coordinate with other work as appropriate to properly interface installation of lighting fixtures with other work. Consult architectural reflected ceiling plan for exact location of all

lighting fixtures.

C. Provide all necessary supports, brackets, and miscellaneous equipment for mounting of fixtures. Support all ceiling mounted fixtures from the building structure; independent of the ceiling system, unless noted. Support each recessed fixture (fluorescent incandescent, and/or HID) from the building structure with #12 ga. steel wire attached to each corner (in addition to supports normally provided for attachment to the ceiling system). Provide backing supports above (or behind) sheetrock, plaster and similar ceiling and wall materials. Support surface mounted ceiling fixtures from channel. Support ceiling mounted outlet boxes independent of the raceway system, and capable of supporting 200 pounds. Feed each recessed fixture directly from an outlet box with flex conduit as required; do not loop from fixture to fixture. See plans for additional details.

# D. FIXTURE WHIPS:

- 1. Provide each lay-in light fixture with at least 36" (Not to exceed 72") of 3/8" steel flexible conduit.
- 2. With-in spaces utilizing 0-10v control schemes ie: Room Controllers, the fixture whip shall be comprised of a MC-PCS Cable (see Section 26 0532 Conduit raceways) with at least 36" and not to exceed 72" in length located above removable grid ceilings.
- E. Coordinate lighting in mechanical room with duct and equipment locations to avoid obstruction of illumination.
- F. Provide gypsum board protection as required, (acceptable to fire official having jurisdiction) to ensure fire rating of each ceiling that the fixtures are installed in.

## G. COORDINATION MEETINGS:

- 1. Meet at least twice with the architect and ceiling installer. Hold first meeting before submittal of shop drawings to coordinate each light fixture mounting condition with ceiling type. During second meeting, coordinate fixture layout in each area.
  - a. Coordinate mounting height of pendant and wall mounted fixtures.
  - b. Coordinate conduit layout in all open ceiling spaces e.g. Gym, Commons, Auditorium, etc. with architect prior to rough-in.
- Meet at least twice with the AV/Intercom systems Installer. Hold first meeting before submittal of shop drawings to coordinate each AV equipment, speaker mounting condition with ceiling type. During second meeting, coordinate AV equipment, speaker layout in each area.
- 3. Meet at least once with the mechanical installer prior to fabrication and installation of duct work. Coordinate depth and location of all fixtures and duct work in all areas.

# H. ADJUST AND CLEAN:

- 1. Clean lighting fixtures of dirt and debris upon completion of installation.
- 2. Protect installed fixtures from damage during remainder of construction period. Repair all nicks and scratches to appearance of original finish.

## 3.2 FIELD QUALITY CONTROL:

- A. Upon completion of installation of lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements.
- B. Where possible, correct malfunctioning units at site, then retest to demonstrate

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compliance; otherwise remove and replace with new units, and proceed with retesting.

- C. At the time of Substantial Completion, replace lamps in interior lighting fixtures that are observed to be noticeably dimmed after the Contractor's use and testing, as judged by Architect/Engineer.
- D. GROUNDING:
  - 1. Provide equipment grounding connections for each lighting fixture.

**END OF SECTION 26 5100** 

# **SECTION 27 1500 - TELEPHONE/DATA SYSTEMS**

# **PART 1 – GENERAL**

# 1.1 SCOPE OF DOCUMENT:

- A. The following are project specifications that all cabling systems must adhere to. These specifications apply to all installers (hereinafter referred to as "the Contractor") for all sites, that require, standards-compliant structured cabling systems and shall be used for all the installation, testing, and acceptance of the information transport systems as described in the attached specifications. Prices quoted of the installation facilities shall be all-inclusive and represent a complete installation at such sites as prescribed in this specification and contract documents. The Contractor shall be solely responsible for all parts, labor, testing, acceptance and all other associated processes and physical apparatus necessary to turn-over a completed system fully warranted and operational for acceptance by the Customer. Final acceptance of the installation shall be in writing by the Architect and Engineer.
- B. In all instances where Standards are cited, it is assumed Installer will have familiarity with and implicitly follow the recommendations of the most current version of the Standard referenced at the time of installation. Compliance with most current Standards is the sole responsibility of the Contractor.

# 1.2 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-7 Firestopping, apply to work of this section.
- C. Division-26 Basic Materials and Methods sections apply to work specified in this section.

#### 1.3 SCOPE OF WORK:

- A. The extent of telephone/data system work is indicated by drawings and is hereby defined to include, but not be limited to racks, cabinets, patch panels, cables, raceway, outlet boxes, device plates, backboard, and grounding. Contractor is responsible for installation of all specified and unspecified necessary and miscellaneous items required for delivery of a complete and functional data cabling and device system.
- B. Contractor shall provide complete cable and outlet system as indicated on the drawings and described herein. Work shall include all associated infrastructure transmission components and support appliances including, but not be limited to cable, jacks, terminal blocks, racks, cabinets, wire management, labeling, transient voltage surge suppression, patch cords, telecommunications grounding system and all terminations as specified herein.
- C. Contractor shall provide system testing as described herein using up-to-date and industry accepted Level IIIe, IV, V test equipment appropriate to the types of links being tested and in accordance with the latest edition of IEC 61935-1. All testers used shall be factory calibrated within one year of use with references set daily prior to testing.
- D. All active equipment (electronics) will be owner furnished and owner installed.
- E. Contractor shall be solely responsible for all parts, labor, testing, documentation and all other associated processes and physical apparatus necessary to turn-over the completed system fully warranted and operational for acceptance by Owner and Engineer.
- F. Contractor shall provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

- G. Copper solution must match optical fiber solution and be provided by the same manufacturer. No two separate warranties are acceptable for the copper connectivity and optical fiber connectivity.
- H. Contractor shall provide 1-1" EMT conduit from telecommunications outlet/connector to EF/ER/TR/TE.

#### 1.4 CONTRACTOR QUALIFICATIONS

- A. The contractor shall be fully conversant and capable in the cabling of low voltage applications such as, but not limited to voice and data network systems. The Contractor shall at a minimum possess the following qualifications:
  - Must have at a minimum (1) RCDD certified individual employed full time at the time of bidding and throughout entire project. PROVIDE PROOF OF RCDD CERTIFICATION IMMEDIATELY UPON JOB AWARD.
  - 2. Approved and certified by connectivity manufacturer. Provide proof of certification immediately upon job award.
  - 3. BICSI Certified Installers or equivalent.
  - 4. Possess those licenses/permits required to perform telecommunications installations in the specified jurisdiction.
  - 5. Have a minimum of 5 years in the communications structured cabling business and be able to provide three owner references for the type of installation described in this specification for projects within the last 18 months.
  - 6. Personnel trained and certified in fiber optic cabling, splicing, termination and testing techniques. Personnel must own not rent a light meter or fiber test adapter head, and OTDR and shall be factory certified by the manufacturer of the products being installed.
  - 7. Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.
  - 8. Personnel knowledgeable in local, state, province and national codes, and regulations. All work shall comply with the latest revision of the codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall be followed.
  - Be factory certified by the manufacturer used in installation of all transmission components of all copper and fiber links and able to provide the manufacturer warranty.

# 1.5 QUALITY ASSURANCE

- A. Coordinate all installations with the Ogden School District and comply their standard installations.
- B. Owner IT Contact:
  - 1. Ogden School District
- C. BNA IT Contact:
  - 1. Drayton Bailey; drayton@bnaconsulting.com, 801-532-2196

# 1.6 APPLICABLE CODES AND STANDARDS

A. Contractor is responsible for compliance with all applicable portions of the NEC code as to type of products used and installation of components. All materials used shall be products and materials that have been UL-listed and labeled. All installed products shall comply with applicable NEMA standards for low loss extended frequency cable.

- B. In addition, installation shall adhere to the following Standards:
  - 1. <u>ANSI/TIA-568-C.0</u> Generic Telecommunications Cabling for Customer Premises, or most recent edition at the time of installation
  - 2. <u>ANSI/TIA-568-C.1</u> Commercial Building Telecommunications Cabling Standards, or most recent edition at the time of installation
  - 3. <u>ANSI/TIA-568-C.2</u> Balance Twisted Pair Communications and Components Standards, or most recent edition at the time of installation
  - 4. <u>ANSI/TIA –942</u> -Telecommunications Infrastructure for Data Centers, or most recent edition at the time of installation
  - 5. <u>TIA-569-B</u> Commercial Building Standard for Telecom Pathways and Spaces, or most recent edition at the time of installation
  - 6. <u>ANSI/TIA-606-A</u> Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, or most recent edition at the time of installation
  - 7. <u>ANSI/NECA/BICSI-607</u> Commercial Building Grounding/Bonding Requirements, or most recent edition at the time of installation
  - 8. ANSI/TIA 1152 Testing of Copper Links
  - 9. <u>BICSI</u> Telecommunications Distribution Methods Manual, 13th edition or most recent edition at the time of installation.
  - 10. <u>TIA 758-A</u> Customer owned Outside Plant Telecommunications Infrastructure Standard (2004), including all applicable addenda and the most recent revision at the time of installation.
  - 11. <u>BICSI</u> Information Transport Systems Installation Manual 5th edition or most recent edition at the time of installation.
  - 12. <u>ANSI/NFPA-70</u> 2017 National Electrical Code, revision, or most recent revision at the time of installation.
  - 13. <u>ANSI/IEEE C-2</u> 2017 National Electrical Safety Code or most recent revision at the time of installation.
  - 14. OSHA Standards and Regulations All applicable
  - 15. Local Codes and Standards All applicable
- C. Note: Anywhere cabling standards conflict with electrical or safety codes, Contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either. Knowledge and execution of applicable codes is the sole responsibility of the Installer. Any code violations shall be remedied at the Contractor's expense.

# 1.7 ACCEPTABLE MANUFACTURERS:

#### A. General:

Unapproved product substitutions are not allowed. Contractor wishing to substitute any products for those expressly specified shall submit three samples of the alternate product to Engineer no less than two weeks prior to the last addendum accompanied by all engineering documents, drawings and third party test data proving mechanical and transmission equivalency. Acceptance of substitutions shall be received from Engineer in writing. All unapproved substitutions installed shall be removed by Contractor who shall assume all costs for removal and replacement with approved products. Such costs shall include, but not be limited to labor, materials, as well as any penalties or fees for late completion.

# B. APPROVED MANUFACTURERS:

- Contractor shall select only one line item in the each section of Parts 2, 3, and 4.
   Contractor shall NOT utilize multiple line items for the project within each Part. For example, if Panduit / General Cable is selected to be used for the project, all copper cabling and connectivity shall be by Panduit or General Cable. No other manufacturer or combination of manufacturers may be used for the copper cabling or connectivity equipment.
- 2. Copper Cabling / Connectivity Approved Manufacturers:
  - a. CommScope
  - b. Panduit/General Cable
  - c. Leviton / Berk-Tek
  - d. Siemon
  - e. Belden/ Mohawk
- 3. Fiber Cabling Approved Manufacturers
  - a. Same manufacturer from Part 2.
  - b. Corning
- 4. Non-Cabling / Connectivity Approved Manufacturers:
  - a. Same manufacturer from Part 2.
  - b. Chatsworth
- **1.8 SUBMITTALS:** Refer to Section 26 0502 for requirements.

# **PART 2 - PRODUCTS**

## 2.1 GENERAL:

- A. All products shall be in new condition and UL listed.
- B. Provide complete raceway, outlet boxes and miscellaneous items. All conduit utilized shall be EMT grade.
- C. Provide 5" x 2.875" (or 4-11/16" x 3.25" square) deep square outlet box at each outlet location with single gang plaster or tile ring. Provide wall board adapters / accessories as necessary.
  - 1. Approved solutions:
    - a. RANDL 5 Square Telecommunications Outlet Box Model <u>TX-550-YY</u> where "X" could be a bracket box and "YY" could be knockout arrangements.
    - b. Hubbell Large Capacity Wall Box Model <u>HBL260</u>. If a 2" knockout is required for installation purposes, provide this box.
- D. Communication grounding and bonding shall be constructed and installed to meet or exceed the requirements of the National Electrical Code (NEC), IEC 1000-5-2 and ANSI/J-STD--607-A throughout the entire grounding system.
- E. All termination hardware shall be rated to meet specified cabling specifications.
- 2.2 ENTRANCE FACILITY (EF) / EQUIPMENT ROOM (ER) / TELECOMMUNICATIONS ROOM (TR)
  - A. General:

- 1. Contractor shall be responsible for the adequate and appropriate design of all racking systems, paying particular attention to sizing of all cable management troughs and supports both horizontal and vertical installation of patch panels and wire management into rack.
- 2. Provide line surge suppressors at main telephone board in ER for all incoming phone lines if not provided by service provider. Provide ground connection to TMGB.
- B. Provide the following, see specifications for each item in this document:
  - 1. Wall Linings in each EF, ER, and TR:
    - a. In addition to the architectural walls, provide plywood wall lining that mounts at 8" A.F.F that shall:
      - i. Be fire-rated or treated on all sides with at least two coats of fire-resistant light-colored paint. Fire-retardant plywood is also acceptable. Leave fire rated stamp on plywood unpainted.
      - ii. Have walls lined with A/C grade or better, void-free plywood, 8 feet high with a minimum thickness of 3/4". See plans for additional wall locations.
      - iii. Install the plywood with grade A surface exposed. Plywood shall be securely fastened to wall-framing members to ensure that it can support attached equipment.
      - iv. Use flush hardware and supports to mount plywood.
      - v. Plywood shall be void free and kiln-dried to a maximum moisture content of 15 percent to avoid warping.
  - 2. Main Cross Connect (MC) / Horizontal Cross Connects (HC):
    - a. Floor Mounted Racks provided by Division 27 4100 (See Plans for Locations). Coordinate layout with AV contractor and locate telecom equipment within accordingly.

Manufacturer	Model Name	Flat Patch Panel
CommScope	Uniprise	UNP-6-DM-2U-48
Panduit	NetKey	NK6PPG48Y
Leviton Leviton		69586-U48
Siemon HD		HD6-48
Belden	Rev	RV6PPF2U48BK

Manufacturer	Model Name	Flat Patch Panel
CommScope	Uniprise	UNP-6A-DM-2U-48
Panduit NetKey		NK6XPPG48Y
Leviton Leviton		6A586-U48
Siemon	Z-Max	Z6A-PNL-U48K
Belden	Rev	RVAPPF2U48BK

- b. Fiber Shelves and Cassettes (Coordinate existing fiber and update as required)
  - i. Provide fiber shelves and cassettes as required to complete project with a maximum of 36 strands in 1RU.
  - ii. Provide rack mounted, sliding type fiber trays as required to complete project.
  - iii. Provide required fiber adapter patch panels that contain modular, dual LC adapter panels as required to complete project. Color for OM3 ports to be aqua, color for OS2 ports to be yellow.
  - iv. Provide minimum 25% spare capacity of fiber adapter panels. Provide additional rack mounted fiber trays/fiber adapter patch panels if necessary to meet 25% spare capacity requirement.
  - v. Approved Equipment

Manufacturer	Model Name	Fiber Shelf	FPP OM3/4	Cassette (OM3)
CommScope	Systimax 360	SD-1U-FX	360DPis-12LC-LS	PNL-CS-12LCX-PT
Panduit	HD-FLEX	FLEX1U06	FAP12WAQDLCZ	FHSXO-12-10P
Leviton	Opt-X	5R1UM-S03	5F100-2QL	SPLCS-12A
Corning	ССН	CCH-01U	CCH-CP24-E4	CCH-CS12-E4- P00TE
Siemon	FCP3	FPC3-DWR	RIC-F-LCQ12- 01C	FSM2-12-LC5L-01
Belden		ECX-01U	FF3X12LD	FC3X06LDFS + FTL3LC900PR12

- e. Vertical Cable Managers:
  - i. Provide a vertical cable management panel on both sides of rack.
  - ii. Manager shall consist of a metal backbone with cable management fingers that align with EIA rack spacing. Provide cover for all cable management.
  - iii. Vertical panel shall be able to manage all the cable on the rack without the aid of horizontal cable managers.
  - iv. Size all vertical cable managers according to factory recommendations for the cable being installed. In no case shall design require more than 35% fill ratio when rack is fully populated.
  - v. Provide molded plastic slack spools in front to facilitate minimum bend radius compliance.
  - vi. Minimum width to be 6".
  - vii. Approved Equipment
    - 1. Chatsworth Velocity Double Sided 1391X-703
    - 2. CommScope VCM-DS-84-xB (6", 8", 10", 12").
    - 3. Panduit PatchRunner PRV6
    - 4. Leviton 8980L-VFR (8")
    - 5. BHVHH06 with BHSK020

- f. Horizontal Cable Management
  - Provide horizontal cable management capable of managing copper and fiber cables.
  - ii. Manager shall consist of bend radius control throughout the fingers, pass through holes, and transitions between horizontal and vertical pathways.
  - iii. Provide front hinged cover that shall open 180 degrees.
  - iv. Manager should mount to standard EIA 19" rack.
  - v. Size according to factory recommendations for the cable being installed. In no case shall design require more than 40% fill ratio when rack is fully populated.
  - vi. Approved Equipment
    - 1. Panduit NMFX, where X refers to the number of rack units
    - 2. <u>CommScope HTK-19-SS-XU</u>, where X refers to the size.
    - 3. Leviton 492RU-HFR (2RU) or 491UR-HFR (1RU)
    - 4. <u>Chatsworth 13930-70X (X denotes 1-3 RU)</u>
    - 5. BHH191UR / BHH192UR
- g. Power Distribution Units (PDUs)
  - Provide monitored vertical mount power outlet unit with amperage and voltage indicated on plans. Unit shall have (24) NEMA 5-20R receptacles per circuit and internal thermal breaker of power outlet unit's listed amperage. Provide data cable to each PDU for reporting.
  - ii. Approved Equipment
    - 1. Chatsworth eConnect P3-1C0A5
    - 2. 9PG2-241003 with XDRPDUK401
- h. Uninterruptible Power Supply (UPS)
  - Provide 1500VA, 120V rack-mounted UPS for each rack/cabinet on project with capability of providing backup to the full connected load for a minimum of 10 minutes, regardless of shown load on electrical panel schedules.
  - ii. Provide a minimum of (2) output receptacles.
  - iii. Provide submittal for each UPS showing run time graph that shows compliance with the specifications.
  - iv. Approved Manufacturers
    - 1. APC
    - Eaton

# 2.3 CABLING DISTRIBUTION SYSTEMS AND MISCELLANEOUS EQUIPMENT

# A. General:

- 1. Provide plenum rated cable/connectors if required, cabling/connectors must be appropriate for the environment that it is installed in. Provide wet rated cable for all wet locations, including any conduit in or below slab on grade.
- 2. Contractor shall be responsible for sizing all pathways such that newly installed cable represents not more than a 35% fill as per manufacturer's directions. Overfilled pathways are the sole responsibility of the Contractor who shall remove and reinstall at Contractors expense.

- 3. Provide products rated for the environment that it is installed in (i.e. riser, plenum, outdoor). All cabling installed in wet locations (i.e. underground conduit, conduit in slab on grade) shall be listed for use in wet locations.
- B. Backbone Cabling Distribution System Optical Fiber

## 1. General:

- a. Provide an optical fiber backbone cabling distribution system between telecommunication spaces. Provide OFNR or OFNP as required. Provide  $900\mu m$  tight-buffered optical fiber cable for premise cable and loose tube for outside plant cable.
- b. Provide fiber jumpers of appropriate length and cable type for each terminated optical fiber port to be connected.
- 2. Multi-Mode Fiber Optic Cable (OM3)
  - a. All multimode optical fiber cabling shall be  $50\mu\text{m}/125\mu\text{m}$  micron laser-optimized cable, designation OM3.
  - b. Provide two strands between each EF/ER, ER/TR, and TR/TE for each 48-port patch panel. Provide a minimum of 6-strands of fiber between telecom rooms unless otherwise noted on plans. Provide 25% extra fiber pair strands if more than 6-strands are required. See riser diagram for additional information.
  - c. Approved Equipment

Manufacturer	Model	Premise Cable (Tight Buffer)		Outside Plant	lands and Outlies an
<u>Manufacturer</u>	<u>Model</u>	<u>Riser</u>	<u>Plenum</u>	(Loose Tube)	Indoor/Outdoor
General Cable	NEXTGEN	<u>BE###1PNR</u>	BE###1PNU	BExxxM1A-DWB	BE###4M1D-DT
CommScope	LazrSPEED 550	<u>R-###-DS-5K</u> -FSUAQ	<u>P-###-DS-5K</u> -FSUAQ	D-###-LN-5L-F12NS	P-###-OD-5K
Berk-Tek	GIGALite	PDRxxx-EB3010/X5	PDPxxx-FB3010/X5	OPDxxx-EB3010/X5	LTPxxx-EB3010
Corning	MIC Cable	xxxT8F-31180-29	xxxT88-33180-29	xxxTU4-T4780-D20	COR-xxxT8P- 31180-29
Siemon		9BB5R012G-T312A	9BB5P012G-T312A	9PE5C(xxx)(x)- T301A	9GD5(x)(xxx)(x)- T301A
Belden		FI3DxxxR9	FI3DxxxP9	FS3LxxxNG	FD3DxxxR9

# 3. Connectors:

- a. Provide LC-Duplex Connectors.
- b. Mechanical connectors are acceptable. Do not utilize polish type connectors. Clean all preterm connectors, no exceptions.
- c. For all simplex connectors, provide duplex type clip.
- d. Approved Manufacturers:

<u>Manufacturer</u>	<u>Multi-Mode</u> (OM3/4)
CommScope	MDC-LCR-16-BG
Panduit	<u>FLCDMx</u>
Leviton	49990-LDL
Corning	95-051-98-SP-X
Siemon	FC1-LB-SC5-9AQ
Belden	FT3LC900FS01

- 4. Primary Protection (Surge Protection)
  - a. General
    - i. Provide surge protection for each pair of copper cabling between buildings and any end point devices that are located outside. For example, if a camera is mounted or located on the exterior of the building—surge protection is required.
    - ii. Surge suppressions shall be achieved through 5-pin, solid state, plug-in type modules for each conductor pair.
    - iii. Provide necessary grounding of equipment to building electrical ground. Size all grounding conductor based on distance to electrical ground according to the requirements of this section.
    - iv. Provide 25% spare modules.
    - v. Approved Equipment
      - 1. For data outlets where POE is present
        - a. ITWLinx 1Gb CAT6-POE.
      - 2. For outlets where no POE is present
        - a. <u>ITWLinx 1Gb CAT6-LAN</u>
      - 3. For copper multi-pair backbones
        - a. ITWLinx ML25-CAT5-75
      - 4. If power is required on all four pairs. (Note: If Cisco switches are connected via a copper backbone, this product is required.)
        - a. ITWLinx 1Gb CAT6-75
- C. Horizontal Cabling Distribution System Balanced Twisted Pair
  - 1. General:
    - a. Provide appropriate number of Category 6 horizontal cables, patch cables, work area cables, for all terminated data drops, between switches, etc. so that building-wide networking will be operational once all installation is complete.
  - 2. Horizontal Cabling
    - a. Provide Cat 6 UTP, min-compliant, 4-Pair  $100\Omega$  Balanced Twisted Pair Cable to all locations shown on plans.
    - b. Provide cabling rated for the environment that it is installed in (i.e underground conduit, conduit in slab on grade). All cabling installed in wet locations shall be listed for use in wet locations.
    - c. Provide a minimum of (2) cables, unless otherwise noted, to each location shown on plans.
      - i. Provide (2) Category 6A cables to each wireless access point (WAP).
    - d. Horizontal cable shall be Data Green, Wireless Airports "AP" Yellow, Intercom Blue, AV Streaming Controls Violet and CCTV Camera's Orange (verify colors with owner prior to ordering cabling).
    - e. Verify environment and provide the appropriate cabling type as required.

# f. Approved Equipment

Cat 6				
Manufacturer	<u>Model</u>	<u>Riser</u>	<u>Plenum</u>	
General Cable	GenSPEED 6	7133800	<u>7131800</u>	
CommScope	Uniprise	65N4	<u>6504</u>	
Berk-Tek	LANmark-6	10136339 (Blue, CMR)	10136226 (Blue, CMP)	
Siemon		9C6R4-E3-06-RXA	9C6P4-E3-06-RXA	
Belden		2412	2413	

Cat 6A					
Manufacturer	<u>Model</u>	<u>Riser</u>	<u>Plenum</u>		
General Cable	GenSPEED 6 10,000	7133819	7131819		
CommScope	Uniprise	UN884031014/10	UN874035114/10		
Berk-Tek	LANMark-10G2	10137700 (Blue, CMR)	10130484 (Blue, CMP)		
Siemon		9C6R4-A5-06AR1A	9C6P4-A5-06AR1A		
Belden		10GXS12	10GXS13		

- f. Field Terminable Plug (FTP)
  - Provide an FTP for each camera and WAP. Provide one FTP for each camera and two FTPs for each WAP. Confirm FTPs are compatible with WAPs and Cameras.
- g. Approved Equipment

WAP/Camera Field Terminable Plug			
<u>Manufacturer</u>	<u>Model</u>		
Panduit	FP6X88MTG		
Leviton	6APLG-S6A		
Siemon	ZP1—6AS-01S		
Belden	RVAFPUBK-S1		

# 3. Patch and Work Area Cables:

- a. Provide and install (1) 7-foot-long patch cable for each workstation and (1) 5 foot or 7 foot patch cable for each patch panel port in the TR/TC. Provide half of the TR/TC patch cables in 5 foot lengths and the remaining half in 7 foot lengths.
- b. No patch or work area cords shall in any case exceed in total 10 meters as per TIA Standard unless design includes Standards compliant MUTOA (multi-user termination outlet) and work area cord adjustments are made according to recommendations for zone cabling contained within TIA 568-

C or most recent revision at the time of installation. Coordinate with owner for preferred patch cord lengths at patch panel and work area.

- c. Copper patch cord and work area outlet cabling must be provided by the same manufacturer and meet the same performance standards as the horizontal cabling.
- d. Patch cord and work area cables shall be green (Verify with owner).
- e. Provide (1) 5 foot, 2-strand optical fiber patch cable for each patch panel, utilizing same performance standards and connector types as specified for the backbone. The cable shall be provided by the same manufacturer and meets the same performance standards as the backbone optical fiber.
- 4. Telecommunications Outlets/Connectors (See Plans for Locations):
  - a. Flat Faceplates:
    - i. Provide modular type information outlets with flat telephone jack or data outlet. Provide single gang faceplate kits to allow up to six data or voice jacks as shown on plans. Provide faceplate kits for wall outlets in colors and materials that match power wiring device plates. Provide faceplate kits that allow labeling schemes described herein. Faceplates shall accept STP, UTP, fiber optic or audio/video modules as an option.
    - ii. Blank off all unused ports.
    - iii. Color: Standard color as selected by owner/architect.
  - b. Weather resistant outlets/connectors:
    - i. Provide outlet and face plate with characteristics stated above with protection against moisture. In areas where water is present (i.e. serving line in cafeteria).
  - c. Approved equipment

<u>Connector</u>					
Manufacturer Model		Connector Cat 6	Connector Cat 6A		
CommScope	GigaSPEED XL	MGS400-xxx	MGS600-xxx		
Panduit	NetKey	NK688Mxx	NK6X88Mxx		
Leviton	QuickPort, eXtreme	61110-Rx6	6110G-Rx6		
Siemon		MX6-(xx)	Z6A-(xx)		
Belden		RV6MJKUxx-S1	RVAMJKUxx-S1		

<u>Manufacturer</u>	<u>Model</u>	Stainless Steel Faceplates
CommScope	GigaSPEED XL	M1xSP
Panduit	Netkey	NKFxs
Leviton	QuickPort, eXtreme	43080-xLx
Siemon		MX-FP-S-(xx)-SS-L
Beldon		AX104232

# **PART 3 - EXECUTION**

# 3.1 GENERAL

A. Prior to pathway rough-in, low voltage contractor shall meet with electrical contractor to review pathway installation requirements.

# B. Pathway Requirements:

#### General:

- a. All pathways shall be designed, constructed, grounded and installed in accordance with all recommendations delineated within TIA 569-B and Standard TIA 942.
- b. Prior to placing any cable pathways or cable, the contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. Field coordinate alternate pathway requirements with other trades onsite. New pathways shall not exceed distance limitations defined within this specification. Notify the Engineer of the changes for final approval prior to proceeding with the change.
- c. Paint all electrical boxes and their covers for the telephone and data system green (Kwal Paint Java Green AC098N).

# 2. Racks / Cabinets:

- a. Racks shall be securely attached to the concrete floor using minimum 3/8" hardware or as required by local codes.
- b. Racks shall be placed with a 36-inch (minimum) clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

# 3. Conduits:

- a. For any interior/exterior conduit 4" and larger, provide (3) 1.25" plenum-rated corrugated innerducts.
- b. Flexible conduit is not acceptable as cable tends to creep, shift, or have sheath damage.
- c. Achieve the best direct route parallel with building lines with no single bend greater than 90 degrees or an aggregate of bends in excess of 180 degrees between pull points or pull boxes.
- d. Conduit runs shall not have continuous sections longer than 100 feet without a pull box and may only be filled to 35% capacity.
- e. Ream all conduit ends and fit with an insulated throat nylon bushing with non-indenter type malleable steel fittings to eliminate sharp edges.
- f. Telecommunications conduits should not be routed over or adjacent to heat sources such as boilers, hot water lines, or steam lines. Neither should they be routed near large motors, generators, photocopy equipment, or electrical power cabling and transformers.
- g. Conduits that enter an EF/ER/TR must terminate near the corners to allow for proper cable racking. Terminate these conduits as close as possible to the wall where the backboard is mounted to minimize the cable route.

- h. Terminate conduits that protrude through the structural floor 1" to 3" above the surface within an EF/ER/TR.
- i. After installation, conduits shall be clean, dry, unobstructed, capped for protection, labeled for identification, reamed and fitted with bushings.
- A 200lb pull cord (nylon, 1/8" minimum) shall be installed in any empty conduit.
- k. When the number of conduits requires more than one row, restrict the number of rows to two wherever practicable.

# 4. Pull Box Requirements:

- a. NEC sized pull boxes are not acceptable. Follow BICSI and EIA/TIA 569-B guidelines for pull box sizing.
- b. Provide pull boxes in sections of conduit that are 100 feet or longer, contain more than two 90-degree bends, or contain a reverse bend.
- c. Conduits that enter the pull box from opposite ends should be aligned.
- d. Pull boxes shall have a length 12 times the diameter of the largest conduit.
- e. All pull boxes must be accessible.

# C. Cabling System:

- 1. Follow T568B scheme for copper cabling terminations.
- It is acceptable to install innerduct within cable tray as long as the fill ratio is not exceeded.
- 3. Fiber slack shall be neatly coiled within the fiber enclosure or cable tray. No slack loops shall be allowed external to the fiber panel. Each cable shall be individually attached to the respective fiber enclosure by mechanical means.
- 4. Provide a minimum of one balanced twisted pair cable to each voice outlet and one balanced twisted pair cable to each data outlet shown on the drawings unless noted otherwise on the drawings.

# 5. Service Loop Requirements

- a. Provide a minimum 6" service loop in each communications system junction box for balanced twisted pair. Cables shall be coiled in the in-wall boxes if adequate space is present to house the cable coil without exceeding manufacturers bend radius.
- b. Provide a minimum 10' service loop in each EF/ER/TR/TE.
- c. Provide a minimum 2' service loop at each stub-up or at each transition from conduit to cable tray.
- d. Provide a 5' service loop in the ceiling before the conduit travels down the wall and terminates into the communications junction box.
- e. Provide a 25' loop at all wireless access point (WAP) locations above the ceiling.
- 6. Provide modular jacks for each installed cable at outlets shown on drawings. Blank off all unused ports on faceplate.
- 7. Provide Velcro type ties for all cables and install in a neat and workmanlike manner. Where applicable, use plenum rated Velcro. Where cable is installed in cable tray, bundle a maximum of 25 cables in each Velcro tie. No zip ties are permitted whatsoever, even for temporarily hanging cables during the installation process

- 8. The bending radius and pulling strength requirements of all backbone and horizontal cables shall be observed during handling and after installation. Use pulling compound as recommended by manufacturer.
- 9. All horizontal cables, regardless of media type, shall not exceed 90 m (295 ft) from the telecommunications outlets in the work area to the horizontal cross connect.
- 10. The combined length of all patch cords in the EF/ER/TR and the work area shall not exceed 10m (33 ft)
- 11. No splices are allowed.
- 12. In a false ceiling environment, a minimum of 3 inches shall be observed between cable supports and false ceiling. At no point shall cable(s) rest on acoustic ceiling grids or panels.
- 13. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- 14. Cables shall not be attached to ceiling grid seismic support wires or lighting fixture seismic support wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.
- 15. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
- 16. Pulling tension for balanced twisted pair shall not exceed 25lbf and for optical fiber shall not exceed 50lbf.
- 17. Pair untwist at the termination shall not exceed 0.125". The cable jacket shall be maintained as close as possible to the termination point.
- 18. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- 19. Cable shall not be draped on, tied or otherwise secured to electrical conduit, plumbing, ventilation ductwork or any other equipment. Cable shall be secured to building supports or hangers or to additional blocks or anchors specifically installed for this purpose.

# D. Grounding System:

- All grounding and bonding shall be done according to ANSI J-STD-607-A, TIA 942, and NEC.
- 2. All cabinets/racks shall utilize paint piercing grounding washers, to be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.
- 3. All racks shall further utilize a full-length rack ground strip attached to the rear of the side rail with the thread-forming screws provided to ensure metal-to-metal contact. Similar to Panduit RGS.
- 4. All active equipment from owner shall be bonded to ground. If the equipment manufacturer provides a location for mounting a grounding connection, that connection shall be utilized. All active equipment shall be bonded using the appropriate jumper for the equipment being installed using the thread-forming screws. Similar to Panduit RG.
- 5. Racks shall have individual, appropriately sized conductors bonded to the grounding backbone. Do not bond racks or cabinets serially daisy-chained rack

grounds will not be accepted.

- 6. Patch panels shall be bonded to racks using the appropriate bonding screws. Mounting rails may utilize cage nuts, threaded holes or thru hole mounting fasteners to secure patch panels to the rails.
- 7. Bond cable tray, raceway system, structural steel and all other metal equipment located within EF/ER/TR to the grounding bus bar utilizing copper conductors per the following schedule:
  - a. ≤25' #34
  - b. ≤50' #2
  - c. ≤66' #2/0
  - d. ≥67' #3/0
- 8. Provide 4" X 12" X 1/4" CU Telecommunication Main Grounding Bus Bar (TMGB) with bonding conductor per schedule above to Intersystem Bonding Terminal (IBT) in each telecommunication room (EF/ER/TR) with a main cross-connect (MC). Provide 20% spare termination spaces on bus bar, provide additional bus bars as necessary to accommodate spare.
- 9. Provide 2" X 12" X 1/4" CU Telecommunication Grounding Bus Bar (TGB) with bonding conductor per schedule above to TMGB in each room with a horizontal cross-connect (HC).
- 10. Refer to electrical diagrams for additional ground connection requirements.
- E. Electromagnetic Compatibility:
  - General:
    - a. Do not install power feeders above or within the telecommunications room. Do not install telecommunications conduits above electrical panelboards, switchboards, transformers, motor control centers, etc.
    - b. Where telecommunication cable is installed in grounded, metallic conduit near power cables, the power cables shall be kept physically separated from telecommunications cables:
      - i. Circuits Under 5kVA: 2" minimum separation.
      - ii. Circuits Over 5kVA: 6" minimum separation.
      - iii. Electrical motors/transformers: 48" minimum separation.
      - iv. Lighting ballasts: 6" minimum separation.
    - c. Where telecommunication cable is installed in cable tray or underground in non-metallic conduit near power cables, the power cables shall be kept physically separated from telecommunications cables by a minimum of 12"
- F. EF/ER/TR Power Requirements:
  - 1. General: Regardless of what is shown on drawings, the minimum requirements for providing power in the EF/ER/TR are as follows and shall be included in bid:
    - Two dedicated, nonswitched 120V/20A duplex receptacles, each on individual branch circuits.
    - b. 120V/20A Duplex receptacles located +6" A.F.F. placed at 6 foot intervals around perimeter walls. Up to 10 receptacles may be placed on a single circuit.
- G. Firestopping and Smoke/Acoustical Pathways(See Also Division 7):
- 1. Provide firestop/smoke barrier solution equivalent to the wall/ceiling/floor rating.

- 2. Provide firestop labels next to each penetration with written date. Label both sides of the penetration.
- 3. Firestop systems shall be UL Classified to ASTM E814 (UL 1479). A drawing showing the proposed firestop system shall be provided to the Engineer prior to installing the Firestop system(s).
- 4. Utilize firestop pass-through type devices for medium to large penetrations into fire walls/floors.
- 5. Provide a minimum of (4) 4" trade size Hilti Speedsleeves (or STI EZPath) with at least one spare for each and every firewall penetration where cable tray meets the wall.
- 6. Provide the following products:
  - a. Fire Rated; <u>STI EZ-Path Fire-Rated Pathways Series</u> (or Hilti Speed Sleeve CP 653 BA)
  - b. Smoke/Acoustical Rated; <u>STI EZ-Path Smoke & Acoustical Pathway</u>
    <u>Series</u> (or Hilti Smoke and Acoustic Sleeve CS-SL SA)

# H. Miscellaneous Equipment:

- 1. Arrange all terminal blocks in a manner that allows natural wiring progression and minimizes crossing of wires.
- 2. Provide patch cords and cross connect cables as necessary for a complete operational telephone and data network system. Consult with owner to determine any special needs such as dedicated phone lines.

## **PART 4 – LABELING**

# 4.1 GENERAL

- A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- B. All telecommunications spaces, pathways, cables, connecting hardware, equipment, racks, patch panels, outlet/connectors, and grounding system shall be labeled in accordance with TIA/EIA 606-A.
- C. All labels shall meet UL 969 requirements for legibility, defacement and adhesion requirements. Handwritten, Ink, or Laser Printing labels are not allowed. Provide labels using thermal transfer print. Heat shrinking or wraparound labels are required, flag style labels are not allowed.

# 4.2 TELECOMMUNICATION PATHWAYS

- A. Identify each dedicated pathway (including inner ducts) for the voice and data system.
- B. Label pathways at regular intervals and wherever they are accessible.

## 4.3 TELECOMMUNICATION CABLES

- A. Identify cables at each end with a permanent label or physical/electronic tag.
  - 1. The same alphanumeric identifiers should be used at both ends of the cable.

- 2. Identify cables at regular intervals throughout and wherever they are accessible.
- 3. Cables shall be identified in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate that can be accessed by removing the cover plate and to the cable behind the patch panel on a section of cable that can be viewed without removing the bundle support ties. Cables labeled within the bundle where the label is obscured from view shall not be acceptable.

#### 4.4 CONNECTING HARDWARE

- A. Identify connecting hardware items (termination blocks, cross-connects, racks, cabinets, patch panels, telecommunications outlet/connectors, ports) using alphanumeric identification such as the following three-level scheme:
  - 1. First level—Termination field or patch panel. Color-coding or other labeling should be used to uniquely identify each termination field (e.g., voice and data) on a common mechanical assembly.
  - Second level—Terminal block within a given field or patch panel that could be a row of insulation displacement connectors (IDCs), optical fiber connectors, or modular jacks.
  - 3. Third level—Defines the individual position within a given terminal block or patch panel.

# 4.5 TELECOMMUNICATIONS GROUNDING SYSTEM

- A. Identify each telecommunications grounding bus bar (TGB) and telecommunications main grounding bus bar (TMGB).
- B. Identify each grounding conductor relating to the telecommunications system, including those connecting building steel, grounding electrodes, water pipes, and telecommunications structural components.

# **PART 5 - MISCELLANEOUS**

## 5.1 TESTING:

# A. General

- 1. Provide testing within 10 days of completion for all copper and fiber optic cable according to TIA/EIA standards and any other requirements of the manufacturer who will provide warranty.
- 2. Submit copy of current calibration of all testing equipment. Submit all test reports electronically to architect/engineer and include in O&M manuals to include test reports. Meter shall have been calibrated within the past 12 months.
- 3. Correct any malfunctions. Contractor shall re-terminate/replace any cable, connection, or equipment found to be defective or non-compliant with these specifications and referenced standards.
- 4. Invite Owner IT representative and Engineer to witness and/or review field testing. Notify five business days prior to commencing testing.

# B. Copper Cable

 Utilize Level IIIe, IV, V Tester to test all equipment and each outlet, horizontal cable, termination block, patch cords, etc. to verify compliance with requirements. Testing shall consist of industry accepted verification tests for the Category of cable installed and shall meet latest requirements of EIA/TIA cabling Standards.

- 2. UTP Cable and Links: All UTP cabling channel must be tested at swept frequencies up to 250MHz for internal channel performance parameters as defined in IEEE 802.3an and ANSI/TIA/EIA-568C. Certifications shall include the following parameters for each pair of each cable installed:
  - a. Wire map (pin to pin connectivity)
  - b. Length
  - c. Insertion Loss
  - d. Near End Crosstalk (NEXT)
  - e. Attenuation to Crosstalk Ratio Far End (ACRF)
  - f. Return Loss
  - g. Propagation Delay
  - h. Delay Skew
  - i. DC Loop Resistance
  - j. DC Resistance Unbalance
  - k. Power Sum Near-End Crosstalk (PS-NEXT)
  - I. Attenuation to Crosstalk Ratio Near-End (ACR-N)
  - m. Power Sum Attenuation to Crosstalk Ratio Near-End (PS-ACR-N)
  - n. Attenuation to Crosstalk Ratio Far-End (ACR-F)
  - o. Power Sum Attenuation to Crosstalk Ratio Far-End (PS-ACR-F)
  - p. Transverse Conversion Loss (TCL)
  - q. Equal Level Transverse Conversion Transfer Loss (ELTCTL)
- 3. All channels that fail testing parameters will be replaced at the Contractor's expense until all channels pass the performance parameters.
- 4. Provide Modular Plug Terminated Link (MPTL) test for all field terminated plugs (standard for cameras and WAPs).
  - a. All installed cabling modular plug terminated links (MPTL) shall comply with the permanent link transmission requirements of the ANSI/TIA-568-2.D standard.
  - b. The MPTL shall be tested with a Permanent Link Adapter on the Main Unit and a Patch Cord Adapter Suitable for Category 6A testing on the Far End or Remote Test Equipment.
  - c. Modular plug terminated link test results, including the individual frequency measurements from the tester, shall be recorded in the test instrument upon completion of each test for subsequent uploading for reports to be generated.
- 5. Sampling is not acceptable. MPTL testing shall be performed on each cabling segment (connector to connector).
- C. Fiber Optic Cable
  - 1. Provide test results using an OTDR of all installed fiber optic links to demonstrate compliance with requirements. Testing shall consist of industry accepted verification tests for the type of cable installed and shall meet the latest requirements of EIA/TIA 455-53A standards. Test setup and performance shall be conducted in accordance with ANSI/TIA/EIA 526-14 Standard Method B.

- 2. Provide inspection of fiber end faces by using scope and test according to IEC 61300-3-35 standards. Correct scratched, pitted, or dirty connectors.
- 3. Provide bi-directional testing of cable for both cable rated wavelengths. Results shall show compliance of cable and shall include the following parameters:
  - a. Attenuation
  - b. Length
  - c. Verification of Polarity
- D. Owner reserves the right to hire an independent testing company to spot check the test results. If the results vary more than 10% from the results provided by the Contractor, the Contractor will be required to prove his results are correct or retest the entire system.

# 5.2 WARRANTY:

- A. Register installation with cable/connectivity manufacturer.
- B. Provide and submit all test results to owner, engineer, and manufacturer and meet all other manufacturer requirements in order to provide minimum 20-year extended product link warranty for complete cabling/connectivity installation, including all copper and optical fiber utilized on the entire channel. The channel warranty shall be provided by the connectivity manufacturer. Include replacement material and installation for any defective product.
- **5.3 OPERATING AND MAINTENANCE MANUALS:** Refer to Section 26 0502 for requirements.

## 5.4 TRAINING:

- A. Provide two hours training on the operation and installation of the structured cabling system at job site, at no cost to owner.
- **5.5 RECORD DRAWINGS:** Refer to Section 26 0502 for requirements.

**END OF SECTION 27 1500** 

# **SECTION 27 4100 - AUDIOVISUAL SYSTEMS**

PART 1 – GENERAL

# 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26, 27 & 28 basic materials and methods sections apply to work specified in this section.
- C. Refer to specification 26 0553 for cabling, conduit and junction box color requirements.
- D. Refer to specification 27 1500 for category and/or optical fiber cable and connectivity specifications.
  - 1. Category cables used for transporting video, audio and controls simultaneously from transmitters to receivers and/or switchers shall follow the Manufacturer's recommend cabling specifications.

# 1.2 ADMINISTRATIVE REQUIREMENTS:

# A. BNA Project Contact:

1. Kiel Mapes, PE, CTS-D

a. Phone: 801-532-2196

b. Email: kmapes@bnaconsulting.com

#### B. Bid Submittal:

- 1. Equipment Costs:
  - a. Breakout cost of equipment, installation material and labor as different line items in bid.

#### C. Coordination:

- 1. Coordinate final inspection of the systems installed, with Audiovisual (AV) Consultant, three (3) weeks in advance.
- 2. Obtain GANTT chart for construction time frame from the General Contractor.
- Coordinate with Electrical Contractor to meet a minimum of two times with the ceiling installer. Conduct first meeting before submittal of shop drawings to coordinate the mounting condition of all ceiling-mounted AV equipment with ceiling type. During the second meeting, coordinate the location of all ceilingmounted AV equipment in each area.
- 4. Meet at least once with the mechanical installer prior to fabrication and installation of duct work. Coordinate depth and location of all loudspeaker and duct work in all areas.
- 5. Meet with Electrical contractor prior to pathway rough-in to coordinate AV system requirements in each area.
- 6. Meet at least once, prior to rough-in, with horizontal cabling installer to verify all AV network requirements. Coordinate cable color according to specification 26 0553.
- Meet at least twice with owner to coordinate AV network requirements. Hold the
  first meeting before submittal of shop drawings to coordinate network protocols,
  including but not limited to: IP address schedules, MAC address schedules,

- patch bay schedules, security requirements, and VLANs. Hold the second meeting prior to AV system deployment.
- 8. Coordinate color and finish of all AV system components with Architect or Electrical contractor as appropriate.
- 9. Coordinate all AV system components within millwork/furniture with millwork shop drawings prior to rough-in.
- 10. Coordinate color (including custom color) and finish of all AV system components with Architect prior to ordering. Architect may require custom color of grills, face plates, etc. AV contractor shall paint or have devices painted by others. The cost for custom colors shall be within the AV Contractors Bid.
- 11. Notify AV Consultant when rough-in is complete and ready to inspect. AV Consultant and Electrical Engineer to sign off on rough-in prior to rough-in resuming rough-in for typical rooms.

# 1.3 DESCRIPTION OF WORK:

- A. Provide the specified systems in a complete and operating condition with all necessary materials and labor to fulfill the requirements and the intent of the drawings and specifications. Except as otherwise indicated, provide manufacturer's standard system components. Contractor shall furnish all cables, materials, and equipment, whether specifically mentioned herein or not, to ensure a complete and functional system.
- B. Master quotes do not relieve contractor from preforming due diligence for equipment type, equipment quantity, and quantity of room types. Any errors, conflicts, or omissions between the drawings and/or specifications and master quotes shall be the responsibility of the contractor to resolve.
- C. Bidders wishing to provide equipment other than the equipment specified shall submit proposed substitute equipment to AV Consultant eight (8) working days prior to bidding. Submittals for prior approval shall include description of equipment, design intent, complete riser diagrams for proposed equipment, equipment specifications, cut sheets of proposed equipment, reason for alternate equipment. AV Consultant may request physical equipment to test and demo. Acceptance of proposed equipment by AV Consultant shall not relieve AV contractor from responsibility to provide audio-visual systems equal to those specified in this Section. Contractor shall be ultimately responsible for providing complete and working audio-visual systems that function, control and operate in the same manner as the specified equipment. AV Consultant has final say if proposed equipment is equal to the specified equipment. Equipment that AV Consultant is not familiar with will require the contractor to provide manufacturer training at manufacturer's facility and have a manufacturer representative present at time of commissioning.
- D. Equipment submitted in the bid proposal that has not been approved by AV Consultant in writing will not be accepted and shall be replaced by approved equipment at contractor's expense. Equipment not listed within this specification, or contract documents, that is required for a complete and working system, shall be of professional grade and used in the same manner as needed for a complete and working system.
- E. Input plates shall match the color and style being used throughout the project.
- F. Contractor is responsible for coordinating with all other trades for equipment locations, mounting requirements, supports and plenum space requirements.
- G. All control processors and controllers are to be on an unswitched power connection.
- H. All cabling shall be installed in a minimum of 1" conduit to accessible ceiling space unless otherwise noted. Provide conduit to accessible ceiling space and then utilize non-

continuous open top cable supports every 5'.

## 1.4 QUALITY ASSURANCE:

#### A. Installer:

- 1. Integrating firm shall have worked satisfactorily for a minimum of five (5) years of completing systems equal to this scope, quality, type and complexity.
- 2. Key personnel assigned to the project shall each have minimum of ten (10) years of experience in completing systems equal to this scope, quality, type and complexity.
- 3. Contractor shall be a factory authorized distributor of all equipment specified for the geographical area of the project.
- 4. Contractor shall maintain complete installation and service facilities for the duration of the project contract.
- 5. Contractor shall have current manufacturer certificates for all AV systems and equipment listed within this specification.
- 6. Contractor shall be in good standing with owner.
- 7. Contractors that do not meet the above requirements cannot bid on this project.
- B. Contractor must follow the standards described within:
  - BICSI/AVIXA AV Design Reference manual.
  - ANSI/AVIXA 2M-2010 Standard guide for Audiovisual Systems Design and Coordination Processes.
  - 3. ANSI/AVIXA 10:2013 Audiovisual Systems Performance Verification Guide.
- C. All work shall be done by expert technicians qualified in the field with knowledge of specified systems. Workmanship shall comply with industry best practices concerning grounding, shielding, cable dressing, cable termination and equipment mounting.
- D. PRE-APPROVED INSTALLERS:
  - AVI-SPL
  - 2. Cache Valley Elec.
  - GenComm
  - Marshall Industries
  - Performance Audio
  - 6. Poll Sound
  - 7. Bids submitted by non-approved installers will not be accepted.
  - 8. Bidders not pre-approved shall submit in writing the following for review at least eight (8) working days prior to bid:
    - a. List of qualifications including:
      - i. Industries certifications including manufacturers.
      - ii. Approved resale manufacturers.
    - b. Past and current projects within the last five (5) years similar in scope and size.
    - c. Three (3) Different referrals from the owners of three (3) different projects within the last five (5) years.

1.5 SUBMITTALS: Refer to specification 26 0502 for shop drawing submittal requirements.

#### 1.6 WARRANTY:

- A. Systems shall be guaranteed for a period of one (1) year from the date of substantial completion against defective materials, inferior workmanship, or improper installation adjustment. Guarantee shall cover all parts and labor.
- B. If system failure causes audiovisual system to be inoperative or unusable for its intended purpose, contractor, when notified of the problem, shall repair system so it will be operational and usable within three (3) business days. If defective components cannot be repaired in time, provide temporary equipment as required.
- C. Contractor shall supply one (1) year warranty on all system programming from the date of substantial completion. During this time period, upon owner request, the contractor shall provide up to four (4) major programming changes free of charge. During this time the programs shall be password protected. At any time during the one (1) year, the owner can terminate the warranty and request the programming of each system. At this time the programs are to be turned over to the owner and all passwords are to be removed. The owner shall own all rights to the programming after this time, to be used in this facility. Provide the Owner written proof that all ownership has been relinquished.
- D. Contractor shall honor equipment warranties for term established by manufacturer if greater than warranty time frame mentioned above.

#### PART 2 - PRODUCTS

## 2.1 GENERAL:

- A. All equipment shall be installed as shown on the drawings and in strict accordance with the specifications. Any errors, conflicts, or omissions discovered in the specifications, or the drawings shall be submitted in writing to the AV Consultant for clarification.
- B. Equipment lists are provided to identify quality and functional expectations. They may not be complete. Coordinate with devices shown on drawings, system risers and equipment lists for system intent. Provide a complete and functional system as described within the construction documents.

## 2.2 MANUFACTURER APPROVED EQUALS:

- A. The Manufacturers listed below have the potential to be considered equals, as it relates to the system design intent and the equipment specified herein. Any equipment chosen as equal to what has been specified in section 2.4 will be the responsibilities of the AV Integrator to coordinate all resulting changes and guarantee a complete and functional system e.g. rough-in requirements, programming, etc. Please note that some components have been chosen over others for features and/or size limitations. Equipment listed below with an asterisk have feature and/or size limitations and may not be substituted.
  - 1. Amplifiers Ashly, Crestron, Crown, Extron, Lab Gruppen, Powersoft, QSC and Stewart Audio
    - a. Due to manufacturer shortages amplifiers will need to be ordered as quickly as possible. Please notify AV Consultant with lead times, changes in shipping and product availability.
  - 2. Cables Belden, Crestron, Extron, Gepco/General, Ice, Kramer, Liberty and Westpenn cables
  - 3. Controls Crestron
  - 4. Displays LG, NEC, Planar, Panasonic, Samsung, Sharp and Sony

- 5. DSPs Biamp, BSS, Extron, QSC and Symetrix
- 6. Equipment racks AtlasIED, Chief, Lowell and Middle Atlantic
- 7. Loudspeakers One-Systems, Community
- 8. Mounts Chief and Premier mounts
- 9. Network equipment Cisco, Luxell, Netgear
- 10. Networked Audio –Extron, QSC, RDL
- 11. Projection Screens Da-Lite, Draper and Stewart Filmscreen
- 12. Video Equipment AMX, Crestron, Extron
- 13. Wall plates Attero tech, Crestron, Extron, RCI Custom and RDL

## 2.3 GENERAL EQUIPMENT REQUIREMENTS:

# A. Loudspeakers:

- 1. Provide applicable mounting equipment as needed, including but not limited to; back boxes, mounting hardware, safety equipment, and seismic restraints.
- B. +Provide virtual touch panel for windows, and/or Mac, controller for full control of the system.
  - 1. Virtual touch panel shall be able to mimic every Touch Panel in the system, and give full control over the touch panel in each room.
  - 2. Virtual touch panel shall be password protected and used for tech support only within the company.

## C. Equipment Racks:

- Coordinate the need for rack accessories with existing head-end rack. Each
  existing rack to be added to or modified within this specification shall have the
  following accessories and/or features, either rack mountable or built into the rack,
  depending on the model of the rack.
  - a. Surge protection for all devices located within the rack. Surge protector shall be: 20 AMPs, rack mountable or mount to a side rail and at least 1,000 joules of protection.
    - i. Acceptable manufacturers: Furman, Juice Goose, Middle Atlantic and SurgeX.
  - b. Horizontal, vertical, and entry cable management.
    - All cabling shall be straight off of the back of equipment to horizontal supports connected to equipment rack.
       Cabling shall follow support to vertical supports when going into other components and/or out of the equipment rack.
    - ii. Cabling secured to other cabling and supported from the connector is not acceptable.
    - iii. Separate AC power and other signal types from each other.
  - c. Power strips as necessary.
    - i. Install wall mounted power strips on wall below mixing console counter in sound booth.
  - d. Security Covers for listed equipment:
    - i. Audio power amplifiers
  - e. Sequencers

- i. Program power sequencer to step system on/off per best practices.
- f. Active Thermal Management
  - i. Vented front door.
  - ii. Fan kit mounted on the top of the equipment rack.
    - 1. Thermostatic fan controller (set temperature range between 80 degrees and 90 degrees Fahrenheit.
    - 2. Fan guards
  - iii. Blank panels on the front of the equipment rack in all unused rack spaces.
  - iv. Stack power amplifiers, no blanks between.
  - v. Provide active thermal management in the following equipment racks in the following systems (if not already existing).
    - 1. Press box Equipment Rack R1

## 2.4 EQUIPMENT REQUIRED PER ROOM TYPE

BASEBALL FIELD / PRESSBOX EQUIPMENT SCHEDULE (1 OF 2)			
TYPE	DESCRIPTION	MANFR.	MODEL NO.
R1	EQUIPMENT RACK, STAND ALONE 77" TALL, 25" DEEP, 44 RU WITH VENTED FRONT DOOR	MIDDLE ATLANTIC	ERK-4425 WITH LVFD-44
	DRAWER, PULL OUT, RACK MOUNT LATCHING W/LOCK, 2RU	MIDDLE ATLANTIC	D2LK
	DRAWER, PULL OUT, RACK MOUNT LATCHING W/LOCK, 3RU	MIDDLE ATLANTIC	D3LK
	BLANK AND VENT PANELS AS REQUIRED/SPECIFIED BY CONSULTANT	MIDDLE ATLANTIC	BL# SERIES VTP-# SERIES
	RAISED SECURITY VENT PANELS AS REQUIRED/SPECIFIED BY CONSULTANT	MIDDLE ATLANTIC	S# SERIES
	BNA LOGO BLANK PANEL, 1RU INCLUDING RJ45 KEYSTONE JACK AND CABLING FOR SERVICE PORT	RCI CUSTOM	BNA001-200120MM-01
	SURGE PROTECTOR	MIDDLE ATLANTIC	PD-920R-SP
RCO	RELAY CONTROLLED OUTLET	MIDDLE ATLANTIC	RLM-20-1CA RLM30-L530-1
M2	DUAL MICROPHONE INPUT, WALL PLATE WITH SOLDER CONNECTIONS	RDL	D-XLR2F
AX	AUXILIARY INPUT, WALL PLATE 3.5 MM & DUAL RCA TO MONO	RDL	D-CIJ3
AXT	TWO GANG, DANTE-ENABLED BLUTOOTH & AUXILIARY AUDIO I/O ENDPOINT	SYMETRIX	XIO BLUETOOTH RCA-3.5 (COLOR BY ARCHITECT)
	CD PLAYER WITH BLUETOOTH AND AUX INPUT	DENON	DN-300Z
WMH	WIRELESS HANDHELD MICROPHONE, WIRELESS RECEIVER KIT	SHURE	QLXD24/SM58 QTY: REFER TO PLANS
WMB	MICROPHONE, WIRELESS RECEIVER AND LAVALIER	SHURE	QLXD14/83 QTY: REFER TO PLANS

WMB	MICROPHONE, WIRELESS RECEIVER AND HEADWORN	SHURE	QLXD14/SM35 QTY: REFER TO PLANS	
	RECHARGABLE BATTERY PACK (SHURE - QLXD AND ULXD)	SHURE	SB900A (PROVIDE QTY.8)	
	8-BAY BATTERY CHARGER (SHURE - SB900)	SHURE	SBC800-US QTY: 1 PER (8) SB900	
AT	ANTENNA DISTRIBUTION SYSTEM WITH DIRECTIONAL ANTENNA (2) TOTAL	SHURE	UA874 (ANTENNA) UA844+SWB	
MB	BROADCAST ANNOUNCER'S MICROPHONE	ELECTRO- VOICE	RE20	
	STAND MOUNT FOR ABOVE	ELECTRO- VOICE	309A OR EQUIVALENT	
	SHOCK MOUNT FOR ABOVE	ELECTRO- VOICE	320 STAND CLAMP	
	ADJUSTABLE HEIGHT DESKTOP MIC STAND 8-13"	ALTASIED	DS7E (PROVIDE QTY.2)	
ALS	ASSISTED LISTENING STATIONARY RF SYSTEM- 72 MHZ INCLUDING: TRANSMITTER ANTENNA KIT RACK MOUNTING KIT (4) RECEIVERS (4) EAR SPEAKERS (2) NECK LOOP LANYARDS 2M DUAL RCA CABLE 12-UNIT CHARGING TRAY NOTIFICIATION SIGNAGE KIT	LISTEN TECHNOLOGIES	LS-55-072 INCLUDING:  (1) LT-800-072-01 (1) LA-122 (1) LA-326 (4) LA-4200-072 (4) LA-401 (2) LA-430 (1) LPT-A107-B (1) LA-381-01 (1) LA-304	
END OF SCHEDULE				

	BASEBALL FIELD / PRESSBOX EQUIPMENT SCHEDULE (2 OF 2)			
TYPE	DESCRIPTION	MANFR.	MODEL NO.	
	NETWORK SWITCH, 10 PORT, 8 PORT POE+	CISCO	SG350-10P	
TPT	TOUCH PANEL, 10" DIAGONAL W/TABLE TOP MOUNT	SYMETRIX	T-10 GLASS TOUCHSCREEN CONTROLLER W/T-10 GLASS TABLE TOP MOUNT	
	WIRELESS CONTROL SURFACE	APPLE	IPAD (LATEST GENERATION), SILVER, 32GB (PROVIDE QTY.2)	
	PROTECTIVE CASE FOR IPAD	OTTERBOX	DEFENDER SERIES (PROVIDE QTY.2)	
	DIGITAL SIGNAL PROCESSOR 12 INPUTS X 12 OUTPUTS	SYMETRIX	PRISM 12X12	
	POWER AMPLIFIER 4 CHANNELS X 600 WATTS	CROWN	DCi 4 600	
A1	HIGH OUTPUT FULL-RANGE 90° X 60° WEATHER-RESISTANT LOUDSPEAKER	COMMUNITY	R.5-96MAX	
	MICROPHONE, CABLES, 10'	WHIRLWIND	10' CABLES (PROVIDE QUANITY 4)	
	MICROPHONE STAND	ATLAS IED	MS20E (PROVIDE QUANTITY 1)	
END OF SCHEDULE				

## PART 3 - EXECUTION

# 3.1 INSTALLATION OF AV SYSTEMS:

- A. Provide AV systems and ancillary equipment as indicated on drawings and in accordance with equipment manufacturer's written instructions, the NEC, and with industry best practices.
- B. Coordinate all work performed by other contractors pertaining to the AV system, including raceways, electrical boxes and fittings.

## C. Pathway Requirements:

#### 1. General:

- All pathways shall be designed, constructed, grounded and installed in accordance with all recommendations delineated within TIA 569-B and Standard TIA 942.
- b. Prior to placing any cable pathways or cable, the contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. Arrangements to remove any major obstructions not identified on plans need to be determined at that time with the Engineer.

## 2. Conduits:

- a. Achieve the best direct route parallel with building lines with no single bend greater than 90 degrees or an aggregate of bends in excess of 180 degrees between pull points or pull boxes.
- b. Provide large radius elbows on all bends.
- c. Conduit runs shall not have continuous sections longer than 100 feet without a pull box. Refer to rough-in schedule for conduit fill capacity.
- d. AV conduits should not be routed over or adjacent to heat sources such as boilers, hot water lines, or steam lines. Neither should they be routed near large motors, generators, photocopy equipment, or electrical power cabling and transformers.
- e. After installation, conduits shall be clean, dry, unobstructed, capped for protection, labeled for identification, reamed and fitted with bushings.
- f. A 200lb pull cord (nylon, 1/8" minimum) shall be installed in any empty conduit.
- g. Furnish and install conduit sleeves through core drilled holes to provide pathways between ceiling coffers. Provide nylon conduit bushings at each end of sleeve to protect cabling.

## 3. Open Top Cable Support Requirements:

- Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables
- b. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.

#### 4. Pull Box Requirements:

- a. NEC sized pull boxes are not acceptable. Follow BICSI and EIA/TIA 569-B guidelines for pull box sizing.
- b. Provide pull boxes in sections of conduit that are 100 feet or longer, contain more than two 90-degree bends, or contain a reverse bend.
- c. Conduits that enter a pull box from opposite ends should be aligned.
- d. Pull boxes shall have a length twelve (12) times the diameter of the largest conduit.
- e. All pull boxes must be accessible.

# D. Cabling System:

- 1. Follow T568B scheme for copper category cabling terminations.
- 2. Follow TIA/EIA-568A for commercial buildings cabling.
- 3. Provide a minimum 6" service loop in each AV system junction box. Cables shall be coiled in the in-wall boxes if adequate space is present to house the cable coil without exceeding manufacturers bend radius.
- 4. In a false ceiling environment, a minimum of three (3) inches shall be maintained between cable supports and false ceiling. At no point shall cable(s) rest on lay-in ceiling grids or panels.
- 5. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- 6. Cables shall not be attached to ceiling grid seismic support wires or lighting fixture seismic support wires. Where support for AV cable is required, the contractor shall install appropriate carriers to support the cabling.
- 7. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
- 8. Pulling tension for balanced twisted pair shall not exceed 25lbf and for optical fiber shall not exceed 50lbf.
- 9. Pair untwist at the termination shall not exceed 0.125". The cable jacket shall be maintained as close as possible to the termination point.
- 10. Cable shall not be draped on, tied or otherwise secured to electrical conduit, plumbing, ventilation ductwork or any other equipment. Cable shall be secured to building supports or hangers or to additional blocks or anchors specifically installed for this purpose.
- 11. Group cabling together with expandable nylon loom, Techflex Flexo or equivalent when cabling exists a cavity and connects to a device. Cabling within a lectern, podium or millwork shall have expandable nylon loom sleeve as well.

# E. Grounding System:

- 1. All grounding and bonding shall be done according to ANSI J-STD-607-A, TIA 942, and NEC.
- 2. All cabinets/racks shall utilize paint piercing grounding washers, to be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.
- 3. All racks shall further utilize a full-length rack ground strip attached to the rear of

the side rail with the thread-forming screws provided to ensure metal-to-metal contact. Similar to Panduit RGS.

- 4. All active equipment shall be bonded to ground. If the equipment manufacturer provides a location for mounting a grounding connection, that connection shall be utilized. All active equipment shall be bonded using the appropriate jumper for the equipment being installed using the thread-forming screws. Similar to Panduit RG.
- 5. Racks shall have individual, appropriately sized conductors bonded to the grounding backbone. Do not bond racks or cabinets serially daisy-chained rack grounds will not be accepted.
- 6. Refer to electrical diagrams for additional ground connection requirements.
- F. Cabling groups and conduit separation:
  - Refer to "CABLING GROUPS AND CONDUIT SEPARATION SCHEDULE".
- G. Firmly secure all equipment in place that is not intended for portability.
- H. Mount projectors permanently and provide mechanical index ensuring precise alignment of the projected image.
- I. Provide adequate structural support for AV system components. Provide fastenings and supports with a safety load factor of at least five.

#### 3.2 LABELING

- A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and wall plates. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- B. All labels shall meet UL 969 requirements for legibility, defacement and adhesion requirements. Handwritten labels are not allowed. All labels shall maintain consistent typeface, size and color.
- C. Provide laminated plans (minimum size 11x17) of all AV as-built plans (including riser diagrams) in each and every AV Rack.

# 3.3 CONTROL SYSTEM FUNCTIONALITY:

#### A. GENERAL:

All programming (uncompiled source code) shall be turned over to owner after 1
year and all final changes have been made to the system. Passwords shall be
removed from the program at this time.

## B. DETAILED SCOPE OF WORK / SYSTEM FUNCTIONALITY:

- 1. Baseball Field / Press box:
  - a. Configure Bluetooth pairing PIN to restrict unauthorized users from pairing. Set PIN to school district preference prior to project completion. Notify consultant in writing with PIN code for testing and commissioning.
  - b. Configure desktop touch panel with Symetrix ARC-WEB application to allow for source selection and volume control for all source devices as

part of system. Work with AV consultant to provide intuitive GUI for ease of use. Controls shall include:

- System ON/OFF soft keys for remote power sequencer trigger. The intent is to allow the system to be powered on and off from either the control touch panel and/or supplied iPad(s).
- ii. Fader volume control with VU meter for all input sources shown.
- iii. Overall Volume fader control
- iv. Mute buttons for each source
- Configure password protected "tech" page with the following functions:
   Notify consultant in writing with password for testing and commissioning.
  - . Maximum system volume level adjustment without the need for a service visit to reprogram audio DSP.
    - Reserve 6dB headroom above maximum volume setpoint corresponding to maximum main digital fader position for owner adjustment.
- d. Configure the two (2) supplied iPads with Symetrix ARC-WEB application to allow for source selection and volume control for all source devices provided as part of the system. GUI shall mirror the tabletop touch panel in functionality. Work with AV consultant to provide intuitive GUI for ease of use. Provide username and password security for iPad and/or ARC-WEB application.
- e. Configure audio DSP to trigger relay-controlled outlet for power amplifier.
- f. Audio DSP shall be on an unswitched power supply.
- g. Provide in-drawer charging for wireless microphone batteries charger base, ALS receiver charger base and wireless control surface (iPad). Provide extended IEC power cabling as required to allow for full drawer actuation.
- h. Hang assisted listening signage in high traffic area where it will be noticed. Coordinate with owner for final placement

## 3.4 CYBER SECURITY

- A. Contractor shall change all default username and passwords for all network devices provided. A Strong Password should include at a minimum the following:
  - Be at least 12 characters in length
  - 2. Contain both upper and lowercase alphabetic characters (e.g. A-Z, a-z)
  - 3. Have at least one numerical character (e.g. 0-9)
  - 4. Have at least one special character (e.g. ~!@#\$%^&\*()\_-+=)
  - Cannot contain full words
- B. No written username or passwords shall be located in any areas of installation.
- C. Network devices to be set up on a separate network other than owner's LAN ensuring no internal or external users can access system without authorization.
- D. Follow manufacturers hardening guide and use best industry practices to secure network and devices provided by contractor and associated with system.

## 3.5 FIELD QUALITY CONTROL:

#### A. TESTING:

- Refer to Appendix A, "INTEGRATOR VERIFICATION CHECKLIST", for system verification requirements. Verification checklist shall be complete prior to final commissioning.
- Upon completion of installation of each system and after electrical circuitry has been energized, demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units on site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with testing.
- 3. Before inspection by owner and AV Consultant, and after completion of the installation, conduct system tests and make necessary corrections for proper system operation.
- 4. Adjust, balance and align equipment for optimum quality and to meet the manufacturer's published specifications.
- 5. All limiters and/or compressors shall be set to prevent operators from overadjusting sound levels and damaging system components, while maintaining the highest amount of gain possible.
- 6. System shall have no audible hum, noise, RFI, or distortion when operating under normal conditions. System shall reproduce material at the loudspeakers rated output level without audible distortion. All input levels shall be pre-set so system may be operated without causing unstable feedback under normal use.
- 7. System shall have no image distortion, hum bars, color shift, or any other picture distortion while operating under normal conditions. Provide cable equalizers, located near displays, on all cables that are more than 30 feet in length and/or have more than four (4) connection points.
- 8. Adjust gain controls for optimum signal-to-noise with 0 dBu at a line-level input.
- 9. Perform polarity checks of loudspeaker lines by means of a polarity tester or use DC source at one end of each line and a voltmeter at the other end. Loudspeaker lines shall be identically polarized with respect to color coding.
- 10. Loose parts and poor workmanship or soldering shall be replaced.
- 11. Sweep Loudspeaker systems with high-level sine wave or 1/3 octave pink noise source. Correct causes of buzzes or rattles related to Loudspeakers or enclosures. Notify owner of external causes of buzzes or rattles.
- 12. Equalize the loudspeakers to produce less than 6 dB total variation between 500 Hz and 8000 Hz (+/- 3 dB).
- 13. Contractor shall provide system testing as described herein using up-to-date and industry accepted test equipment appropriate to the types of links being tested and in accordance with the latest edition of IEC 61935-1. AV Contractor shall own and have access to a handheld Quantum Data 780C tester to allow for onsite verification testing and troubleshooting of HDMI and digital video networks and analog video displays. All test equipment used shall be factory calibrated within one year of use with references set daily prior to testing.
- 14. Contractor shall provide HDCP compliant device with digital cables, and digital HDCP content for testing of routing and HDCP compliant distribution and switching. Also provide analog VGA output equipment for testing of video switching, scaling, and distribution if analog is included with this project.

- 15. Horizontal cabling contractor shall test all twisted pair cabling used within the AV system following the standards in specification 27 1500 under the testing section. Provide documentation of testing to AV Consultant prior to final walk through.
- B. At the time of final commissioning, if the AV consultant determines that the systems are not sufficiently complete to do a final punch list and was not notified at least three (3) days prior to the visit, then a return visit will be required. The AV Consultant's return visit will be paid for in advance by the AV integrator at a flat rate of \$500 per person, at no cost to the owner.
- 3.6 OPERATING AND MAINTENANCE MANUALS: Refer to Section 26 0502 for requirements.

#### 3.7 TRAINING:

- A. Provide two (2) sessions of two (2) hours each of training on the operation of the system, at job site, at no cost to owner.
- B. Training shall include but not be limited to the following:
  - 1. Installation and setup of ARC-WEB application on designated authorized staff smartphones for control of audio system.
  - 2. Installation and use of Listen Everywhere smart device application in addition to educating staff about the RF ALS capabilities of the system.
  - 3. Thorough walk through of control touch panel functionality.
- C. Training shall be video recorded in a professional manner (no smartphones). Two (2) digital copies shall be provided to the owner.
- D. The second training shall take place within one (1) month of the first training and all questions shall be answered.
- E. Contractor shall be present at the first event using the system. Owner must coordinate with contractor three (3) weeks in advance to allow for scheduling of personal trained on the system to be available to help with the game/event. AV Contractor shall provide this service as part of base bid.
- 3.8 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

END OF SECTION 274100

## SECTION 310700 GENERAL SITE CONSTRUCTION REQUIREMENTS

## PART 1 GENERAL

#### 1.1 SUMMARY

#### A. Includes But Not Limited to

1. General procedures and requirements for Site Work.

PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION

#### 3.1 PREPARATION

#### A. Site Verification Of Conditions

- 1. 48 hours minimum prior to performing any work on site, contact Blue Stakes 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 5 days minimum in advance of performing any excavation or underground work.
- 4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within 24 hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.
- 5. Notify Owner of utilities a minimum of 48 hours prior to an work taking place.

## 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.
- 2. Dust Control
  - a. 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. Erosion Control -
  - 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 if required by law.
  - c. Repair and correct damage caused by erosion.
- 4. Existing Plants And Features Do not damage tops, trunks, and roots of existing trees and shrubs on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect. Do not damage other plants and features which are to remain.

- 5. Protect site from fire caused by welding, cutting, smoking, or other sources of ignition.
- B. If specified precautions are not taken or corrections and repairs 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.

#### C. Fees

1. Contractor shall be responsible for all off site street cut fees, encroachment permit fees, and bonding associated with the construction of the proposed facility.

## 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 which require adjustment.

## 3.4 FIELD QUALITY CONTROL

- A. Notify Architect 48 hours prior to performing excavation or fill work.
- B. If work has been interrupted by weather, scheduling, or other reason, notify Architect 24 hours minimum prior to intended resumption of grading or compacting.
- C. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

END OF SECTION 310700

#### SECTION 311000 - SITE CLEARING

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Removing existing trees, shrubs, groundcovers, plants, and grass as indicated on demolition plan.
  - 2. Clearing and grubbing.
  - 3. Stripping and stockpiling topsoil.
  - 4. Removing above- and below-grade site improvements.
  - 5. Disconnecting, capping or sealing, abandoning site utilities in place, and removing site utilities.
  - 6. Temporary erosion and sedimentation control measures.

## B. Related Sections include the following:

- 1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security, protection facilities, and temporary erosion and sedimentation control procedures.
- 2. Division 01 Section "Temporary Tree and Plant Protection" for protecting trees remaining on-site that are affected by site operations.
- 3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
- 4. Division 23 Section "Turf, Grasses, and Plants" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

## 1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### 1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

## 1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## 1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

#### PART 2 - PRODUCTS

## 2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
  - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

#### PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

#### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control Drawings, a sediment and erosion control plan, specific to the site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

## 3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in Division 21, Division 22, Division 26, Division 27, and Division 28 Sections covering site utilities.

#### 3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
  - 4. Use only hand methods for grubbing within tree protection zone.
  - 5. Remove tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

## 3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Limit height of topsoil stockpiles to 120 inches.
  - 2. Dispose of excess topsoil as specified for waste material disposal.
  - 3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

## 3.6 SITE IMPROVEMENTS

- A. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction. Refer to project plans for improvements to be abandoned in place.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

# 3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
  - 1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

**END OF SECTION 311000** 

#### SECTION 312000 - EARTH MOVING

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All provisions, restriction and recommendation from the Geotechnical report for this project are a part of the contract documents and shall be binding as such. See GSH report No. 1829-03N-15 dated September 16, 2015.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Preparing sub-grades for slabs on grade, walks, pavements, lawns and grasses, and exterior plants.
  - 2. Excavating and backfilling for buildings and structures.
  - 3. Drainage course for slabs-on-grade.
  - 4. Subbase course for concrete walks and pavements.
  - 5. Subbase and base course for asphalt paving.
  - 6. Subsurface drainage backfill for walls and trenches.
  - 7. Excavating and backfilling for utility trenches.
  - 8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

## B. Related Sections include the following:

- 1. Division 01 Section Construction Progress Documentation and Photographic Documentation for recording pre-excavation and earthwork progress.
- 2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
- 3. Divisions 21, 22, 23, 26, 27, and 28 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
- 4. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above-grade and below-grade improvements and utilities.
- 5. Division 32 Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.
- 6. Division 32 Section "Plants" for planting bed establishment and tree and shrub pit excavation and planting.

## 1.3 UNIT PRICES

A. Quantity allowances for earthwork are included in Division 01 Section "Allowances."

#### 1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the work.
  - 2. Bulk Excavation: Excavation more than 10-feet in width and more than 30-feet in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cubic yard for bulk excavation or 3/4 cubic yard for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090-lbf and stick-crowd force of not less than 18,650-lbf; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of plastic warning tape.
  - Geotextile.
  - 3. Controlled low-strength material, including design mixture.
- B. Samples: 12-by-12-inch Sample of sub-drainage and other geotextiles used.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D698 or ASTM D1557 for each on-site and borrow soil material proposed for fill and backfill.
- D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

## 1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## 1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
  - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

#### PART 2 - PRODUCTS

# 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of these groups; free of rock or gravel larger than 3-inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Native rock crushed to meet the above requirements and free from significant porosity may also be used as satisfactory soils. Satisfactory soils listed in the geotechnical report prepared on September 16, 2015 by GSH for this project may be used if approved by submittal process to the engineer.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups. Unsatisfactory soils listed in the geotechnical report prepared on September 16, 2015 by GSH for this project may not be used.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: UDOT Specification 02721 Class A aggregate consisting of well graded, clean, hard, tough, durable, and sound mineral aggregates consisting of crushed gravel, crushed stone, or crushed slag, free of organic matter and contamination from chemical or petroleum products; with at least 90 percent passing a 1-inch sieve and not more than 11 percent passing a No. 200 sieve. Sand Equivalency of 35 or greater.

Table 1					
Aggregate Properties					
	Aggregate Class				
	Α	В			
Dry Rodded Unit Weight	Not less than	n 75 lb/ft <sup>3</sup>	AASHTO T 19		
Liquid Limit/Plastic Index	Non-plastic	PI ≤ 6	AASHTO T 89		
Liquid Limit/Plastic Index			AASHTO 90		
Aggregate Wear	Not to excee	d 50 percent	AASHTO T 96		
Gradation	Table 2		AASHTO T 11		
Gradation			AASHTO T 27		
CBR with a 10 lb surcharge	70%	N/A	AASHTO T 193		
measured at 0.20 inch penetration	Minimum	IN/A	AASHTO I 193		
Two Fractured Faces	50% Min	N/A	AASHTO T 335		

Table 2			
Gradation Limits			
Sieve Size	Job Mix Gradation	Job Mix Gradation	
	Target Band	Tolerance	
1½ inch	100		
1 inch	90 - 100	±9.0	
3/4 inch	70 - 85	±9.0	
½ inch	65 - 80	±9.0	
3/4 inch	55 - 75	±9.0	
No. 4	40 - 65	±7.0	
No. 16	25 - 40	±5.0	
No. 200	7 - 11	±3.0	

Percent passing based on total aggregate (dry weight) and fine and coarse aggregate with approximately the same bulk specific gravities.

- F. Structural Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 15 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 3/4-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed or crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Non-woven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
  - 1. Survivability: Class 2; AASHTO M 288.
  - 2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
  - 3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
  - 4. Tear Strength: 56 lbf; ASTM D 4533.
  - 5. Puncture Strength: 56 lbf; ASTM D 4833.
  - 6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
  - 7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
  - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
  - 1. Survivability: Class 2; AASHTO M 288.
  - 2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
  - 3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
  - Tear Strength: 90 lbf; ASTM D 4533.
  - 5. Puncture Strength: 90 lbf; ASTM D 4833.
  - 6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
  - 7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
  - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

## 2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:

- 1. Portland Cement: ASTM C 150, Type II.
- 2. Fly Ash: ASTM C 618, Class C or F.
- 3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch to 3/8-inch nominal maximum aggregate size.
- 4. Foaming Agent: ASTM C 869.
- 5. Water: ASTM C 94/C 94M.
- 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
  - As-Cast Unit Weight: 30 to 36 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
  - 2. Compressive Strength: 80 psi, when tested according to ASTM C 495.

## 2.4 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows when required by utility purveyor:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.

## PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

#### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
  - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

## 3.3 EXPLOSIVES

A. Explosives: Explosives are not permitted on this project.

## 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24 inches outside of concrete forms other than at footings.
    - b. 12 inches outside of concrete forms at footings.
    - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    - e. 6 inches beneath bottom of concrete slabs on grade.
    - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

## 3.5 EXCAVATION FOR STRUCTURES

- Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  - 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility
Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or
minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

## 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades. Fill placed on existing ground for site walks, pavements and all other improvements shall be placed on 1 foot of processed and recompacted existing material.

## 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multipleduct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
  - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

## 3.8 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons or vehicle with similar unit axel weight.

- 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

## 3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  - Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

## 3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations.

# 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

## 3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 12 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of subbase material or satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
- G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- H. All utility trench backfill shall comply with the plans and specification and any additional requirements of the utility purveyor who will own them at the time they are accepted by the purveyor. See utility purveyors or city standards for additional backfill material requirements.
- I. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- J. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- K. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

#### 3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use structural fill.
  - 4. Under building slabs, use structural fill.
  - 5. Under footings and foundations, use structural fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

## 3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

- Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
- 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

#### 3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 12-inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Reduce loose depths as needed to achieve required compactions.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
  - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent if in landscaping areas or 95 percent if under structures, pavements, or walks.

## 3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch
  - 3. Pavements: Plus or minus 1/2 inch
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

#### 3.17 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

- 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends where called for on details and on plans.
- 2. Place base course material over subbase course under hot-mix asphalt pavement.
- 3. Shape subbase and base course to required crown elevations and cross-slope grades.
- 4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
- 5. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
- Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698 or ASTM D 1557.
- C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698 or ASTM D 1557 where called for on project plans.

#### 3.18 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabson-grade as follows:
  - 1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
  - 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## 3.19 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

- 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
- 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
- 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

## 3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

## 3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 312000

#### **SECTION 312319 DEWATERING**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

A. Section includes construction dewatering.

#### B. Related Sections:

- 1. Division 01 Section "Construction Progress Documentation and Photographic Documentation" for recording preexisting conditions and dewatering system progress.
- 2. Division 31 Section "Earth Moving" for excavating, backfilling, site grading, and for site utilities.
- 3. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.
- 4. Division 33 Section "Subdrainage" for permanent foundation wall, underfloor, and footing drainage.

# 1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
  - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
  - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
  - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
  - 5. Remove dewatering system when no longer required for construction.

## 1.4 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.

- Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
- 2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Qualification Data: For qualified Installer.
- D. Field quality-control reports.
- E. Other Informational Submittals:
  - 1. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in dewatering systems and dewatering work.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to dewatering including, but not limited to, the following:
    - Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
    - b. Geotechnical report.
    - c. Proposed site clearing and excavations.
    - d. Existing utilities and subsurface conditions.
    - e. Coordination for interruption, shutoff, capping, and continuation of utility services.
    - f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - g. Testing and monitoring of dewatering system.
    - h. Other agenda items.

## 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  - 1. Notify Architect no fewer than two days in advance of proposed interruption of utility.
  - 2. Do not proceed with interruption of utility without Architect's, Construction Manager's, and Owner's written permission.

- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
  - 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
  - 2. The geotechnical report is referenced in the Project Manual.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  - During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
  - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
  - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Division 01 Section "Temporary Facilities and Controls" and Division 31 Section "Site Clearing" during dewatering operations.

## 3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
  - 1. Space well points or wells at intervals required to provide sufficient dewatering.
  - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 1. Maintain piezometric water level a minimum of 12 inches below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
  - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

## 3.3 FIELD QUALITY CONTROL

- A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.
  - 1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
  - 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

- 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION 312319

#### SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. Section includes temporary excavation support and protection systems.

## B. Related Sections:

- 1. Division 01 Section "Construction Progress Documentation and Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
- 2. Division 01 Section "Temporary Facilities and Controls" for temporary utilities and support facilities.
- 3. Division 31 Section "Dewatering" for dewatering system for excavations.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
  - 1. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
  - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
  - 4. Monitor vibrations, settlements, and movements.

## 1.4 SUBMITTALS

- A. Shop Drawings: For excavation support and protection system.
- B. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements." Qualification Data: For qualified professional engineer.
- D. Other Informational Submittals:

- 1. Photographs or Videotape: Show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems. Submit before Work begins.
- 2. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
  - a. Note locations and capping depth of wells and well points.

# 1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:
    - a. Geotechnical report.
    - b. Existing utilities and subsurface conditions.
    - c. Proposed excavations.
    - d. Proposed equipment.
    - e. Monitoring of excavation support and protection system.
    - f. Working area location and stability.
    - g. Coordination with waterproofing.
    - h. Abandonment or removal of excavation support and protection system.

## 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  - 1. Notify Architect no fewer than two days in advance of proposed interruption of utility.
  - 2. Do not proceed with interruption of utility without Architect's, Construction Manager's, and Owner's written permission.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.
  - 1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
  - 2. The geotechnical report is referenced elsewhere in the Project Manual.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  - 1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in

elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

### PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
- C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
  - Corners: Site-fabricated mechanical interlock or Roll-formed corner shape with continuous interlock.
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of size and strength required for application.
- E. Shotcrete: Comply with Division 03 Section "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
- F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
- G. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- H. Tiebacks: Steel bars, ASTM A 722/A 722M.
- I. Tiebacks: Steel strand, ASTM A 416/A 416M.

## PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
  - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

## 3.2 SOLDIER PILES AND LAGGING

- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

## 3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

### 3.4 TIEBACKS

- A. Tiebacks: Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
  - 1. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.
  - 2. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and hydrostatic pressures.

### 3.5 BRACING

- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
  - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
  - 2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
  - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

## 3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
  - 1. Remove excavation support and protection systems to a minimum depth of 48 inches (1200 mm) below overlaying construction and abandon remainder.
  - 2. Fill voids immediately with approved backfill compacted to density specified in Division 31 Section "Earth Moving."
  - 3. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 315000

### **SECTION 321313 CONCRETE PAVING**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
  - 1. Driveways and roadways.
  - 2. Parking lots.
  - 3. Curbs and gutters.
  - 4. Walkways.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
  - 2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
  - 3. Division 32 Section "Decorative Concrete Paving" for surface-imprinted, stamped finished concrete pavement.
  - 4. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

# 1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

### 1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Samples: 10-lb sample of exposed aggregate.
- D. Qualification Data: For manufacturer and testing agency.

- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Fiber reinforcement.
  - 4. Admixtures.
  - 5. Curing compounds.
  - 6. Applied finish materials.
  - 7. Bonding agent or epoxy adhesive.
  - 8. Joint fillers.
- G. Field quality-control test reports.
- H. Minutes of preinstallation conference.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- E. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
  - Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 3. Obtain Architect's approval of mockups before starting construction.

- 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
- Demolish and remove approved mockups from the site when directed by Architect.
- 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
  - Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
  - a. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixtures.
  - c. Ready-mix concrete producer.
  - d. Concrete pavement subcontractor.

## 1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  - 2. Products: Subject to compliance with requirements, provide one of the products specified.
  - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  - 1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

# 2.3 STEEL REINFORCEMENT (NO REINFORCEMENT USED FOR FLATWORK)

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- E. Plain Steel Wire: ASTM A 82.
- F. Deformed-Steel Wire: ASTM A 496.
- G. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- H. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- I. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
  - Portland Cement and as specified in Division 3 except that for exterior concrete, UDOT Class AA(AE) with the minimum compressive strength is 4500 psi at 28 days.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials and the referenced projects locations and approximate quantities.

- 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
- 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

# 2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Provide fiber reinforcement in all concrete paving for vehicular traffic excluding curb and gutter. Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.
  - 1. Products:
  - a. Monofilament Fibers:
    - 1) Axim Concrete Technologies; Fibrasol IIP.
    - 2) Euclid Chemical Company (The); Fiberstrand 100.
    - 3) FORTA Corporation: Forta Mono.
    - 4) Grace, W. R. & Co.--Conn.; Grace MicroFiber.
    - 5) Metalcrete Industries; Polystrand 1000.
    - 6) SI Concrete Systems; Fibermix Stealth.
  - b. Fibrillated Fibers:
    - 1) Axim Concrete Technologies; Fibrasol F.
    - 2) FORTA Corporation; Forta.
    - 3) Euclid Chemical Company (The); Fiberstrand F.
    - 4) Grace, W. R. & Co.--Conn.; Grace Fibers.
    - 5) SI Concrete Systems; Fibermesh.

# 2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
  - 1. Products:
  - a. Axim Concrete Technologies; Cimfilm.
  - b. Burke by Edeco; BurkeFilm.
  - c. ChemMasters; Spray-Film.
  - d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
  - e. Dayton Superior Corporation; Sure Film.
  - f. Euclid Chemical Company (The); Eucobar.
  - g. Kaufman Products, Inc.; Vapor Aid.
  - h. Lambert Corporation; Lambco Skin.
  - i. L&M Construction Chemicals, Inc.; E-Con.
  - j. MBT Protection and Repair, ChemRex Inc.; Confilm.
  - k. Meadows, W. R., Inc.; Sealtight Evapre.
  - I. Metalcrete Industries; Waterhold.
  - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
  - n. Sika Corporation, Inc.; SikaFilm.
  - o. Symons Corporation; Finishing Aid.
  - p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
  - 1. Products:
  - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
  - b. Burke by Edoko; Agua Resin Cure.
  - c. ChemMasters; Safe-Cure Clear.
  - d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
  - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
  - f. Euclid Chemical Company (The); Kurez DR VOX.
  - g. Kaufman Products, Inc.; Thinfilm 420.
  - h. Lambert Corporation; Agua Kure-Clear.
  - i. L&M Construction Chemicals, Inc.; L&M Cure R.
  - j. Meadows, W. R., Inc.; 1100 Clear.
  - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
  - I. Symons Corporation; Resi-Chem Clear.
  - m. Tamms Industries Inc.; Horncure WB 30.
  - n. Unitex; Hydro Cure 309.
  - o. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
- F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
  - Products:
  - a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
  - b. Burke by Edoco; Resin Emulsion White.
  - c. ChemMasters; Safe-Cure 2000.

- d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
- e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
- f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
- g. Kaufman Products, Inc.; Thinfilm 450.
- h. Lambert Corporation; Aqua Kure-White.
- i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
- j. Meadows, W. R., Inc.; 1200-White.
- k. Symons Corporation; Resi-Chem White.
- I. Tamms Industries. Inc.: Horncure 200-W.
- m. Unitex; Hydro White.
- n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

# 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Color stain: Match Architect's sample or as selected by Architect from manufacturer's full range of stains.
- C. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- E. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
  - 1. Types I and II, non-load bearing and types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- F. Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
  - 1. Products:
  - a. Burke by Edeco; True Etch Surface Retarder.
  - b. ChemMasters; Exposee.
  - c. Conspec Marketing & Manufacturing Co., Inc.; Delay S.
  - d. Euclid Chemical Company (The); Surface Retarder S.
  - e. Kaufman Products, Inc.; Expose.
  - f. Metalcrete Industries; Surftard.
  - g. Nox-Crete Products Group, Kinsman Corporation; Crete-Nox TA.
  - h. Scofield, L. M. Company; Lithotex.
  - i. Sika Corporation, Inc.; Rugasol-S.
  - j. Vexcon Chemicals, Inc.; Certi-Vex Envioset.

- G. Pigmented Mineral Dry-Shake Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
  - 1. Products:
  - a. Conspec Marketing & Manufacturing Co., Inc.; Conshake 600 Colortone.
  - b. Dayton Superior Corporation; Quartz Tuff.
  - c. Euclid Chemical Company (The); Surflex.
  - d. Lambert Corporation; Colorhard.
  - e. L&M Construction Chemicals, Inc.: Quartz Plate FF.
  - f. MBT Protection and Repair, ChemRex Inc.; Mastercron.
  - g. Metalcrete Industries; Floor Quartz.
  - h. Scofield, L. M. Company; Lithochrome Color Hardener.
  - i. Symons Corporation; Hard Top.
  - 2. Color: Match Architect's sample or as selected by Architect from manufacturer's full range.
- H. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.
- I. Sealer: Apply Euco Guard 100 Weatherproofing Siloxane Sealer or Engineer Approved Equal Sealant to all concrete pavement and pedestrian walks on the site.

## 2.8 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or II or AASHTO M 248, Type N or F.
  - 1. Color: White, Yellow, Blue, Black. See Section 321216 for color locations.
- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.
  - 1. Color: White, Yellow, Blue, Black. See Section 321216 for color locations.
- C. Glass Beads: AASHTO M 247, Type 1.
- D. All striping on concrete pavement shall be underlayed by a black stripe of equal dimensions plus one inch on all sides.

# 2.9 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4500 psi

- Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45
- 3. Select slump limit from options in subparagraph below or revise to suit Project.
- 4. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 5-8 percent nominal maximum aggregate size.
- Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing admixture, high-range, water-reducing admixture, high-range, water-reducing and retarding admixture, plasticizing, and retarding admixture in concrete, as required, for placement and workability.
  - 2. Specify admixtures as part of submittal. Verify that admixtures proposed do not adversely effect stained concrete and will not modify colors of stain.
  - 3. Coordinate acceptability of admixtures with architect.
- F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements as follows:
  - 1. Fly Ash or Pozzolan: 25 percent.
  - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
  - 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. where specified and approved in mix submittal.
- H. Color Stain: Add stain to concrete per manufacturers recommendations and to meet color required by architect and owner on areas of stained concrete.

## 2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

- 2. For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
- 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons or similar axel weight vehicle.
  - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

## 3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

## 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

# 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

# 3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
  - All joints to be sealed and protected within 15 days of their initial construction.
     The contractor shall protect the joints during the 15days prior to sealing from weather and damage.
  - 3. Expansion joints shall be constructed at intervals of no more than 60' on center with a  $\frac{1}{2}$ " expansion joint filler at each end of that distance.
  - 4. Control joints shall be constructed at intervals of no greater than 24 times the pavement thickness and in no case greater than the width of the concrete pavement.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  - 2. Provide tie bars at sides of pavement strips where indicated.
  - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
  - 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

- 1. Locate expansion joints at intervals shown on the jointing plan or as directed by the Architect, unless otherwise indicated.
- 2. Extend joint fillers full width and depth of joint.
- 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
- 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
- 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
- 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
  - 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

## 3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.

- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
  - 1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- J. Concrete placements for site paving shall be performed in increments of no more than 50 cubic yards per day unless the contractor can demonstrate by prior placements that they have both sufficient personnel and equipment to achieve satisfactory results in spite of local conditions and weather.
- K. Screed pavement surfaces with a straightedge and strike off
- L. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- M. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- N. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- O. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- P. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture

- temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
- 2. Do not use frozen materials or materials containing ice or snow.
- 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- Q. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - Cool ingredients before mixing to maintain concrete temperature below 90 deg F
    at time of placement. Chilled mixing water or chopped ice may be used to
    control temperature, provided water equivalent of ice is calculated to total amount
    of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- R. Placement of concrete paving shall not exceed 250 Cubic Yards per day without prior approval from the Architect and Engineer. The contractor shall notify the Architect 48 hours prior to any placement of concrete pavement of over 100 Cubic Yards.

## 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across floatfinished concrete surface perpendicular to line of traffic to provide a uniform, fineline texture.
  - 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
  - 4. Coordinate with architect the locations of each type of finish.

# 3.8 SPECIAL FINISHES

A. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to pavement surface according to manufacturer's written instructions and as follows:

- 1. Uniformly spread dry-shake hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer to match pavement color required.
- 2. Uniformly distribute approximately two-thirds of dry-shake hardener over pavement surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second dry-shake hardener application, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed by power floating.
- 3. After final floating, apply a hand-trowel finish followed by a broom finish to concrete.
- 4. Cure concrete with curing compound recommended by dry-shake hardener manufacturer. Apply curing compound immediately after final finishing.
- B. Coordinate the locations of finishes with the architect and owner prior to placing concrete.

### 3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
  - a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.10 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

- 1. Elevation: 1/4 inch.
- 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
- 3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.
- 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
- 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
- 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
- 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
- 8. Joint Spacing: 3 inches.
- 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
- 10. Joint Width: Plus 1/8 inch, no minus.

## 3.11 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete pavement to cure for 14 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 1. Spread glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.

## 3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
  - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

- 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
- 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
- a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.13 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 321313** 

### SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Expansion and contraction joints within cement concrete pavement.
  - 2. Joints between cement concrete and asphalt pavement.
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.
  - 2. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
  - 3. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

# 1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For installer and testing agency.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Submit not fewer than six (6) pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the commencement of the Work.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

## 1.5 DELIVERY, STORAGE, AND HANDLING

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

## 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - When ambient and substrate temperature conditions are outside limits permitted by jointsealant manufacturer.
  - 2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 3. When joint substrates are wet or covered with frost.
  - 4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

## 2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.3 COLD-APPLIED JOINT SEALANTS

- A. Multi-component Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
  - 1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
    - a. Available Products:
      - 1) Pecora Corporation: Urexpan NR-300.
      - 2) Engineer approved equal.
  - 2. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
    - a. Available Products:
      - 1) Meadows, W. R., Inc.; Sealtight Gardox.
      - 2) Engineer Approved Equal.
  - 3. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
    - a. Available Products:
      - 1) Tremco Sealant/Waterproofing Division; Vulkem 202.
      - 2) Engineer approved Equal.
- B. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

- 1. Available Products:
  - a. Sonneborn, Div. of ChemRex, Inc.; Sonomeric 1.
  - b. Engineer Approved Equal.
- C. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
  - 1. Available Products:
    - a. Crafco Inc.; RoadSaver Silicone.
    - b. Dow Corning Corporation; 888.
    - c. Engineer Approved Equal.
- D. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
  - 1. Available Products:
    - a. Crafco Inc.; RoadSaver Silicone SL.
    - b. Dow Corning Corporation; 890-SL.
    - c. Engineer Approved Equal.
- E. Multi-component Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.
  - 1. Available Products:
    - a. Meadows, W. R., Inc.; Sof-Seal.
    - b. Engineer Approved Equal.
- 2.4 HOT-APPLIED JOINT SEALANTS
  - A. Jet-Fuel-Resistant Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3569.
    - 1. Available Products:
      - a. Crafco Inc.; Superseal 444/777.
      - b. Meadows, W. R., Inc.; Poly-Jet 3569.
      - c. Engineer Approved Equal.
  - B. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.
    - 1. Available Products:
      - a. Crafco Inc.; Superseal 1614A.
      - b. Meadows, W. R., Inc.; Poly-Jet 1614.
      - c. Meadows, W. R., Inc.; Poly-Jet 3406.
      - d. Meadows, W. R., Inc.; Poly-Jet 3569.
      - e. Engineer Approved Equal.

- C. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.
  - Available Products:
    - a. Crafco Inc.; Superseal 444/777.
    - b. Meadows, W. R., Inc.; Poly-Jet 3406.
    - c. Engineer Approved Equal.
- D. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.
  - Available Products:
    - a. Koch Materials Company; Product No. 9005.
    - b. Koch Materials Company; Product No. 9030.
    - c. Meadows, W. R., Inc.; Sealtight Hi-Spec.
    - d. Engineer Approved Equal.

## 2.5 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

### 2.6 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

## 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of backer materials.
  - 2. Do not stretch, twist, puncture, or tear backer materials.
  - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses provided for each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealants from surfaces adjacent to joint.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

# 3.4 CLEANING

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

# 3.5 PROTECTION

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

# 3.6 DOCUMENTATION

A. The contractor shall keep a daily log of all joints sealed in graphical format. This shall be submitted to the Architect on a weekly basis.

**END OF SECTION 321373** 

### SECTION 321813 - SYNTHETIC GRASS SURFACING

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes synthetic grass surfacing.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for preparation, compaction, and grading of granular base.

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For synthetic grass surfacing.
  - 1. Include sections and details.
  - 2. Show locations of seams and method of seaming.
  - 3. Show layout of game lines, numbers, and letters. Indicate application method of each line and marking.
  - 4. Show location and layout of team logo/graphics.
- C. Samples: For each type of synthetic grass surfacing indicated.
  - 1. Turf Fabric: 12 inches square.
  - 2. Game Line Turf Fabric: 12 inches long by actual width.
  - 3. Infill Material: 4 oz. of each type.
  - 4. Seam Sample: 24 inches square with seam centered in sample.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer testing agency.
- B. Product Test Reports: For each synthetic grass surfacing assembly.
- C. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For synthetic grass surfacing, including maintenance cleaning instructions, to include in maintenance manuals.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Turf Fabric: Minimum of 300 sq. ft. for each type indicated.
  - 2. Infill: Minimum of One bags of each type.
  - 3. Seaming Tape and Adhesive: One roll of seaming tape and one gallon of adhesive.
  - One new set of maintenance tools of type recommended by synthetic grass surfacing manufacturer for installation.

#### 1.8 QUALITY ASSURANCE

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

# 1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials in location and manner to allow installation of synthetic grass surfacing without excess disturbance of granular base.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace synthetic grass surfacing that fails in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration and excessive wear.
    - b. Deterioration from UV light.
    - c. Excessive loss of shock attenuation.
    - d. Seam separation, including game lines and markings.
  - 2. Warranty Period: 12 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Turf Fabric: Turf fabric tested according to the following methods, with additional test method conditions for each method according to ASTM F 1551.
  - 1. Tuft Bind: Not less than 8 lbf according to ASTM D 1335.
  - 2. Breaking Strength: Minimum 200 lbf in warp direction and minimum 200 lbf perpendicular to warp direction, according to ASTM D 5034.

- B. Synthetic Grass Surfacing: Assembly tested according to the following methods, with additional test method conditions for each method according to ASTM F 1551.
  - 1. Shock Attenuation: No greater than 165 G(max) at time of installation according to ASTM F 355.
- C. Permeability: Less than 40 in./h of rainfall capacity according to ASTM F 2898 or EN 15330-1.

## 2.2 SYNTHETIC GRASS SURFACING

- A. Synthetic Grass Surfacing: Complete surfacing system, consisting of synthetic yarns bound to water-permeable backing and infill indicated, suitable for multipurpose sport baseball playing fields.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. A-Turf Incorporated.
    - b. FieldTurf, a Tarkett Sports Company.
    - c. Shaw Sports Turf Division of Berkshire Hathaway.
    - d. Sporturf International Division of Controlled Products, LLC.
    - e. Sprinturf; Specialty Surfaces International.
- B. Turf Fabric: Woven turf fabric with multicolored fiber and UV resistance, complying with the following:
  - 1. Yarn Fiber: Slit-film polyethylene.
  - 2. Lead Content of Yarn Fiber: Maximum of 100 ppm according to ASTM F 2765.
  - 3. Pile Weight: 60oz/sq. yd. according to ASTM D 5848.
  - 4. Pile Height: 2 Inches according to ASTM D 5823.
- C. Backing: Manufacturer's standard woven or nonwoven polypropylene primary backing with urethane-coated secondary backing; provide perforations or drainage channels sufficient to meet permeability indicated.
- D. Infill: Manufacturer's standard sand and rubber infill.
  - 1. Infill Proportions: Manufacturer's standard proportions.
- E. Game Lines and Markings: Provide game lines and markers in widths and colors according to requirements indicated on Drawings.
  - Application Method: Tufted into the maximum extent practicable, with remaining lines inlaid.
  - 2. Team Logo/Graphic: Provide inlaid team logo/graphic in colors and design indicated.
- F. Seaming Method: Sewn.

# 2.3 MATERIALS

A. Seam Tape: Synthetic grass manufacturer's recommended seam tape, minimum 12 inches wide, 18 inches wide for inlaid game lines.

B. Seaming Cord: Seaming cord or thread, recommended by the synthetic grass surfacing manufacturer.

### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine base and other conditions, with Installer present, for compliance with requirements for installation tolerances, permeability, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Avoid disturbance of base during installation of turf fabric.
- B. Shock-Attenuation Pad Installation: Roll out pad and allow to relax a minimum of six hours prior to final fit and trim. Stagger head seams between adjacent rows. Fit seams snugly without stretching or forcing.
- C. Roll out turf fabric and allow to relax at least four hours prior to seaming.
- D. Provide seams flat and snug, with no gaps or fraying. Remove yarns that are trapped within seams. Attach turf fabric to perimeter restraint system as recommended by the manufacturer.
- E. Install inlaid game lines and markings by cutting through turf fabric and installing snugly fitting game line turf fabric. Provide seaming tape that extends minimum 6 inches beyond seam.
- F. Repair loose seams and bubbles formed due to expansion of turf fabric prior to installation of infill.
- G. Evenly broadcast and groom infill by machine in proportions and depth after settling as recommended by the manufacturer, and to meet indicated performance requirements. Rake fibers trapped by infill to surface.
- H. Painted Game Lines: Apply lines and markings as recommended by the game line paint manufacturer.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
  - 1. Shock Attenuation: No greater than 165 G(max) at time of installation according to ASTM F 1936.

# END OF SECTION 321813

#### SECTION 321826 - WARNING TRACK

## PART 1 - GENERAL

## 1.1 SUMMARY

A. This section includes the labor requirements for construction of a warning track in the outfields.

### B. Related Sections:

1. Division 31 sections for site preparation and earthwork.

#### 1.2 SUBMITTALS

A. Product Data: For the product specified, submit a 5-pound sample along with a private lab test result indicating the particle size analysis of the material specified. All tests shall be performed in accordance with ASTM F-1632.

## B. Approved Testing Lab:

- 1. Turf & Soil Diagnostics, 35 King Street, Trumansburg, NY 14886.
- 2. Contractor to provide a letter addressed to the Owner, from the testing lab with a recent date and the name of this Project in the subject line that indicates the product to be supplied meets the specification requirements.

## 1.3 PROJECT / SITE CONDITIONS

- A. All site work and earthwork shall be performed in accordance with the preceding sections. Compact sub-base material to 90 percent. If conditions do not warrant such compaction, then an imported select granular fill shall be installed. Furthermore, the compacted sub-grade shall be installed in accordance with the final slope and shall mirror finish grade in order to ensure an even depth of material once placement has occurred.
- B. Under no circumstances are perforated pipe under drains necessary or recommended for use under any infield skin material. Geotextile fabric is not recommended between the compacted sub-base and the infield skin material.
- C. A survey of the sub-grade elevations shall occur prior to placement of the material.

## 1.4 QUALITY ASSURANCE

### A. Submit:

1. Installer Qualifications: Installers of materials specified shall have, at minimum, five (5) successful installations of similar projects and materials. Installers shall be in possession of and demonstrate knowledge of the use of laser guided finishing equipment.

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# PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Warning Track Material: DuraTrax Warning Track. as manufactured by Natural Sand Company, Inc., Slippery Rock, Pa., 866-867-0052, or an approved equal.

## 2.2 WARNING TRACK AGGREGATE GRADATION

A. DuraTrax Warning Track is an engineered product which is mechanically mixed offsite in a controlled environment using a pugmill-type mixer. This process ensures thorough mixing of the sand and clay components to exact specifications.

## B. Performance Specification

1. Warning Track shall be clean, crushed brick mixed with #10 limestone resulting in a mix that is reddish brown in color, having a yield of 1.3 tons per cubic yard and possessing the following particle size analysis:

a.	Sieve Designation		Range of % Passing
	1)	3/8"	100
	2 <u>)</u>	No. 4	90-100
	3)	No. 8	60-78
	4)	No. 16	42-55
	5)	No. 30	20-40
	6)	No. 50	8-20
	7)	No. 100	5-12
	8)	No. 200	0-5

# 2.3 ATTIC STOCK MATERIAL

A. Provide the owner with a 1-ton pallet of material.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. The subgrade surface is to be uniform and free of rocks, depressions, voids, and irregularities. The contractor will hire a third-party surveyor to stake the subgrade and verify the subgrade meets the required 1/2-inch slope and tolerance.
- B. Verify surface elevations of the finished subgrade. The surface elevations must conform to the elevations shown on Drawings.
- C. Established Subgrade Elevation shall be predetermined by the Contractor to allow for depth of) material. Surveyor to provide AutoCad drawing showing all points and elevations.
- D. Representatives of the Owner, Architect, Contractor and Manufacturer of material shall meet and inspect completed subbase prior to start of construction of infield and warning track products. The

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inspection meeting shall occur after subbase has been laser-graded, staked at 15 feet on center, and certified by a third-party surveyor to be within the required tolerances. If the subbase meets the requirements of the applicable plans and specifications, as determined by Owner, Architect and Engineer, the installation of the material shall begin immediately to protect the subbase from weather and construction activities.

- E. Determine condition of subbase and regrade and compact the required areas to be within 1/2-inch of required elevations. Check for improperly compacted base, debris and improper gradients, and do not start installation until all undesirable conditions have been corrected.
- F. Ensure that any sharp objects on the subbase are removed to avoid penetration of fabric or membrane liners. Keep the subbase surface as smooth as possible while working. Any irregularities in the subbase surface will be visible after the material is installed.

### 3.2 PLACEMENT

# A. Placement of Warning Track Material

- 1. First, excavate material from the warning track area to a depth of seven (7) inches below the final finished grade.
- 2. Compact the subgrade until 90 to 95% compaction is achieved.
- 3. Install geotextile fabric to prevent future weed migration through the warning track area.
- 4. On top of the geotextile fabric, place 3 inches of 2A limestone capped with 1 inch of limestone dust, for a total of 4 inches.
- 5. Laser grade the subgrade to within specified tolerances prior to placement of the warning track material.
- 6. Finally, place the warning track material over the top of the limestone dust. The depth of the warning track material should be three (3) inches at completion after compaction.
- 7. When placing both the limestone and the warning track material, use lifts of two (2) inches and compact with a minimum 1-ton vibratory roller until an optimum compaction between 90% and 95% is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved. Completing this process as described will minimize settling and improve the performance of the product.
- 8. The warning track and limestone layers beneath it must have a one half (1/2) percent slope toward the outfield fence. See drawings.

## 3.3 INSPECTION

A. The finished surface of the infield shall be smooth and free from any visible dips, humps, bumps or other blemishes which would hinder the removal of water through positive surface drainage. Where warranted, a finished elevation survey shall be conducted to assure proper installation.

**END OF SECTION 321826** 

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#### SECTION 321827 - INFIELD SOILS

### PART 1 - GENERAL

### 1.1 SUMMARY

A. This section includes the material and labor requirements for construction of a complete infield skin and top dressing, pitcher's mound clay and batter's box soils.

# B. Related Requirements:

- 1. Section 0123000 "Alternates" for description of applicable bid alternates.
- 2. Division 31 Sections for site preparation and earthwork.

## 1.2 SUBMITTALS

- A. Product Data: For the product specified, submit a 5-pound sample along with a private lab test result indicating the particle size analysis of the material specified. All tests shall be performed in accordance with ASTM F-1632.
- B. Approved Testing Labs include but are not limited to the following:
  - 1. Turf and Soil Diagnostics, 35 King St., Trumansburg, NY 14886, (607) 387-5694.
  - 2. Contractor shall provide a letter addressed to the Owner, from the testing lab with a recent date and the name of this Project in the subject line that indicates the product to be supplied meets the specification requirements.

## 1.3 PROJECT / SITE CONDITIONS

- A. All site work and earthwork shall be performed in accordance with the preceding sections. Sub-base material shall compact to 90 percent. If conditions do not warrant such compaction, an imported select granular fill shall be installed. Furthermore, the compacted sub-grade shall be installed in accordance with the final slope and shall mirror finish grade in order to ensure an even depth of material once placement has occurred.
- B. A survey of the sub-grade elevations shall occur prior to placement of the infield skin material.

### 1.4 QUALITY ASSURANCE

# A. Submit:

1. Installer Qualifications: Installers of materials specified shall have, at minimum, five (5) successful installations of similar projects and materials. Installers shall be in possession of and demonstrate knowledge of the use of laser guided finishing equipment.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Infield mix material shall be:
  - 1. DuraEdge Classic Infield Mix.
  - 2. Elite Athletics. Premier Infield Mix.
  - 3. Or approved equal
- B. Infield mix shall be clean, dry clay mixed with washed mason-type sand resulting in a weed-free mixture that is reddish brown in color having a yield of 1.35 tons per cubic yard when placed loose or 1.5 tons per cubic yard when compacted 85% 90% on a Standard Proctor Test (ASTM D 689-07). The material possesses the following particle size analysis:
  - 1. Total sand content shall be 70-75 percent.
  - 2. The combined amount of sand retained on the medium, coarse and very coarse sieves shall be greater than or equal to 50 percent.
  - 3. The combined amount of silt and clay shall be 25-30 percent.
  - 4. The ratio of silt divided by clay, otherwise known as the SCR, shall be 0.5 1.0.
  - 5. No particles greater than 3 millimeters.
  - 6. Equal to or less than 5 percent of particles shall be retained on the 2 millimeter sieve.
  - 7. Manufacturer:
    - a. As manufactured by DuraEdge Products, Inc., Grove City, PA, (866) 867-0052, or an approved equal.
- C. Top Dressing: Pro-slide Top Dressing. Applied in 1/8 to 1/4 inch thickness in accordance with manufacturer's instructions.
  - 1. Product: ProSlide Engineered Topdressing or approved equal, available through DuraEdge Products, Inc., Grove City, PA, (866) 867-0052.
- D. Premium Mound Clay: For pitcher's mound and/or batters boxes on both fields.
  - 1. Pitching mound and batter's box clay is clean, dry clay mixed with washed mason- type sand resulting in a weed-free mix that is reddish brown in color having a yield of 1.75 tons per cubic yard and possessing the following particle size analysis:
    - a. Total sand content shall be 15-28 percent.
    - b. The overall clay content shall be greater than 30 percent.
    - c. The ratio of silt divided by clay, otherwise known as the SCR, shall be 0.75 1.25.
    - d. Material meeting this specification is DuraPitch Premium Mound Clay

### 2.2 ATTIC STOCK MATERIALS

- A. Provide the owners' authorized representative with the following pallet delivered materials:
  - 1. A 1000 lb stockpile of infill mix material for future use.
  - 2. Five 50 lb bags of top dressing
  - 3. Five 50 lb bags of pitcher's mound clay

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## PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. The subgrade surface is to be uniform and free of rocks, depressions, voids, and irregularities. The contractor will hire a third-party surveyor to stake the subgrade and verify the subgrade meets the required 1/2-inch slope and tolerance.
- B. Verify surface elevations of the finished subgrade. The surface elevations must conform to the elevations shown on Drawings.
- C. Established Subgrade Elevation shall be predetermined by the Contractor to allow for depth of soil material. Surveyor to provide AutoCad drawing showing all points and elevations.
- D. Representatives of the Owner, Architect, Contractor and Manufacturer of infield soil material shall meet and inspect completed subbase prior to start of construction of infield and warning track products. The inspection meeting shall occur after subbase has been laser-graded, staked at 15 feet on center, and certified by a third-party surveyor to be within the required tolerances. If the subbase meets the requirements of the applicable plans and specifications, as determined by Owner, Architect and Engineer, the installation of the soil materials shall begin immediately to protect the subbase from weather and construction activities.
- E. Determine condition of subbase and regrade and compact the required areas to be within 1/2-inch of required elevations. Check for improperly compacted base, debris and improper gradients, and do not start installation until all undesirable conditions have been corrected.
- F. Ensure that any sharp objects on the subbase are removed to avoid penetration of fabric or membrane liners. Keep the subbase surface as smooth as possible while working. Any irregularities in the subbase surface will be visible after the soil material is installed.

## 3.2 PLACEMENT

- A. Place the infield material in lifts of 2 to 3 inches and lightly compact until an optimum compaction between 85 and 90% is achieved on a standard proctor test (ASTM D 689-07). Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved. Completing this process as described will minimize settling and improve the performance of the product. See details.
  - 1. Depth of the material shall be 4 inches (including top dressing) when finished and compacted.
- B. Place the batter's box and pitcher mound material in lifts of two (2) inches and compact with 1-ton vibratory roller until an optimum compaction between 90% and 95% is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved.
- C. Depth of the material shall be 4 inches when finished and compacted.

### 3.3 WATERING

A. The material should be delivered with optimum moisture, adding water is not necessary. If unable to achieve optimum compaction a light application of water may be required.

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## 3.4 FINISH GRADING

A. Finish grading will be performed by the soils material installer. The material shall be laser graded to accuracy of 1/8 inch plus or minus. A slope of 1/2 to 1 percent will be placed to facilitate drainage.

## 3.5 TOP DRESSING

- A. Top Dressing installation will be performed by the soil materials installer
- B. Following successful inspection, topdressing shall be applied to the surface for optimum product performance. This topdressing is either expanded shale or calcined clay product and shall be added at a rate of 1 pound per 1 square foot for new construction.

END OF SECTION 321827

INFIELD SOILS 321827 - 4

#### SECTION 323113 - CHAIN LINK FENCES AND GATES

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Chain-link fences.
    - a. Galvanized steel fabric.
    - b. Galvanized steel framework for fencing, including top rails; sizes engineered by the manufacturer.
  - 2. Swing gates.
  - 3. Heavy industrial gate hardware.
  - 4. Fence wind fabric and caps for outfield fence.
  - 5. Vinyl privacy Slats

# B. Related Requirements:

- 1. Section 0123000 "Alternates" for description of applicable bid alternates.
- 2. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete post footings.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Fence and gate posts, rails, and fittings.
    - b. Chain-link fabric, reinforcements, and attachments.
    - c. Gates and hardware.
- B. Shop Drawings: For each type of fence and gate assembly.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include accessories, hardware, gate operation, and operational clearances.
- C. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Product Certificates: For each type of chain-link fence, operator, and gate.
- C. Product Test Reports: For framework strength according to ASTM F 1043, for tests performed by manufacturer and witnessed by a qualified testing agency.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.
- B. Single-Source Responsibility: Obtain chain link fences, including accessories, fittings, and fastenings, from a single source.

### 1.6 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

#### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.
- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
  - Provide engineering of the backstop framing as required to provide adequate sizing of framing members as required based upon heights and spans of backstop system.
     Increase framing beyond that indicated herein if required to withstand code required wind loading.
  - 2. Design Wind Load: 115 mph, Ultimate Design Wind Speed Vult.
    - a. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified, but not less than the sizes indicated in Article 2.3, "Fence Framework."

### 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights, up to twelve feet, two-pieces woven together over twelve feet, measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
  - 1. Fabric Height: 6 feet, unless indicated otherwise on Drawings.
  - 2. Steel Wire for Fabric: Wire diameter of 0.148 inch.
    - a. Mesh Size: 2 inches.
    - b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied after weaving.
  - 3. Selvage: Knuckled at both selvages.

### 2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:
  - 1. Fence Height: 6 feet, unless indicated otherwise on Drawings.
  - 2. Round Steel Pipe Equivalent Sizes: Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) or the equivalent trade sizes in inches. The following indicates these equivalents all measured in inches:

<u>Actual</u>	<u>NPS</u>	
<u>OD</u>	<u>Size</u>	<u>Trade</u>
		<u>Size</u>
2.375	2	2 -1/2
2.875	2-1/2	3
3.500	3	3-1/2
4.000	3-1/2	4
6.625	6	6-5/8
8.625	8	8-5/8

- 3. Heavy-Industrial-Strength Material: Group IA, round steel pipe, Schedule 40; Group IC, round steel pipe, electric-resistance-welded pipe.
  - a. Type I Round Posts: Group 1A, 30,000 psi minimum yield strength, Type A coating and weights per foot as follows:

<u>Actual</u>	<u>Weight</u>	NPS
<u>OD</u>	(lb/ft)	
2.375	3.65	2
2.875	5.79	2-1/2
3.500	7.58	3
4.000	9.11	3-1/2
6.625	18.97	6
8.625	28.55	8

b. Type II Round Posts: Group IC, 50,000 psi minimum yield strength, either Type B, external Type B/internal Type D, or Type C protective coating and weights per foot as follows:

<u>Actual</u>	<u>Weight</u>	NPS
OD	(lb/ft)	
2.375	3.12	2
2.875	4.64	2-1/2
3.500	5.71	3
4.000	6.56	3-1/2

- 4. Line Post Sizing: . Line post selection guideline serves as a minimum for engineering by the fence manufacturer.
  - a. Minimum post size based on 2 inch, 9 gauge mesh,105 mph wind speed, Exposure Category B, no icing, Group 1A, schedule 40 pipe, regular grade, 30,000 psi steel.
  - b. Fences Supporting Wind Fabric: Provide the next larger size in the sizing chart. Manufacturer to provide engineering confirming wind loading with added fabric.
  - c. Pipe terminal posts are a minimum of one size larger in outside diameter than line posts.

Fence Fabric	Group 1A ASTM Sch. 40	Group 1C (Electric-Resistance)
	Minimum:	Minimum:
up to 6'-0"	1.900"	1.900"
over 6'-0" to 8'-0"	2.375"	2.375"
over 8'-0" to 10'-0"	2.875"	2.875"
over 10'-0" to 12'-0"	3.500"	2.875"
over 12'-0" to 14'-0"	3.500"	3.500"
over 14'-0" to 16'-0"	4.000"	4.000"

- d. End, Corner, and Pull Posts: 2.875 inches in diameter minimum.
- 5. Horizontal Framework Members: Intermediate, top and bottom rails according to ASTM F 1043.
  - a. Top Rails and Bottom Rails: Manufacturer's longest lengths (17 to 21 feet) with swedged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post.
    - 1) 1.66 inches in diameter Type I or II steel pipe. All fencing to have bottom rails with tension band clamps securing fabric at 18 inches on center.
    - 2) Provide bottom rails where indicated.
- 6. Metallic Coating for Steel Framework:
  - a. Type A: Not less than minimum 2.0-oz./sq. ft. average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating according to ASTM A 653/A 653M.
  - b. Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.

- c. External, Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil-thick, zinc-pigmented coating.
- d. Type C: Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. coating.

### 2.4 INDUSTRIAL SWING GATES

- A. General: ASTM F 900 for gate posts and single and double swing gate types.
  - 1. Gate Leaf Width: As indicated, with 36 inches minimum at single swing gates.
  - 2. Framework Member Sizes and Strength: Based on gate fabric height of 72 inches or less; as indicated on Drawings.
- B. Pipe and Tubing:
  - Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework.
  - 2. Gate Posts: Round tubular steel.
  - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Hardware (Heavy Industrial):
  - 1. Hinges: 360-degree inward and outward swing.
  - 2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
    - a. Fabricate latches with integral eye openings for padlocking.
    - b. Heavy industrial latches at double leaf gates.
    - c. Industrial locking latch at single leaf gates.
  - 3. Keepers: At gate leaves 5 feet wide and over.

### 2.5 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post.
  - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  - 1. Top Rail Sleeves: not less than 6 inches long.
- E. Tension and Brace Bands: 3/4-inch-wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.
  - 1. Tension Bands: 0.074 inch thick (14 gage) minimum.

- 2. Brace Bands: 0.105 inch thick (12 gage) minimum.
- 3. Coating Type II zinc in the following class as determined by ASTM A 90.
  - a. Class 1, with a minimum coating weight of 0.80 oz. per sq. ft. of uncoated wire surface.
- F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric, with a minimum cross section of 3/16 inch by 3/4 inch. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
    - a. Hot-Dip Galvanized Steel: 0.106-inch-diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
    - b. Aluminum: ASTM B 211; Alloy 1350-H19; 0.148-inch-diameter, mill-finished wire.

### I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.

### 2.6 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations:
  - 1. Where required for repair of and to match existing.
  - 2. At new fencing, unless bottom rails are indicated in Drawings.
- B. Metallic-Coated Steel Wire: 0.177-inch-diameter, marcelled tension wire complying with ASTM A 817, ASTM A 824, and the following:
- C. Metallic Coating: Type II, zinc coated (galvanized) by hot-dip or electrolytic process, with the following minimum coating weight:
  - 1. Class 1: Not less than 0.8 oz./sq. ft. of uncoated wire surface.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a certified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
  - Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
  - 1. Do not begin installation before final grading is complete, unless otherwise permitted.
  - 2. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 10 feet o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate and Bottom Rails: Secure to posts with fittings.

- I. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

### 3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

### 3.5 ADJUSTING

- A. Gates: After repeated operation of completed installation equivalent to 3 days' use by normal traffic, readjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION 323113

## SECTION 328400 - IRRIGATION SYSTEMS

#### PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes valves, piping, sprinklers, specialties, accessories, controls, and wiring for irrigation systems.
- B. Field verify capacity of the existing irrigation system complete including but not limited to flow, capacity, controller operation and etc.
- C. Repair and remodel sections of the existing irrigation system as required.
- D. Remodel sections of the existing irrigation system at the beginning of the project construction as required to maintain the viability of all plant material on the site shown to remain.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Section 011000 "Summary."
  - 2. Section 329300 "Landscape Planting."

## 1.3 DEFINITIONS

- A. Piping sizes used in this Section are normal pipe size (NPS) in inches. Tube sizes are standard size in inches. Equivalent SI (metric) sizes are indicated in millimeters (mm) in parentheses.
- B. Supply Piping: Piping from water source to connection to irrigation system pressure piping. Piping is under same pressure as water supply. Piping in this category is not included in this Section.
- C. Pressure Piping: Piping downstream from supply piping to and including control valves. Piping is under irrigation system pressure. Piping in this category includes pressure regulators, water meters, and backflow preventers, when used.
- D. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, emitters, devices, and drain valves. Piping is under pressure (less than pressure piping) during flow.
- E. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone, including isolation or zone valves.
- F. Drain Piping: Downstream from circuit or pressure piping drain valves. Piping is not under pressure.
- G. Drain Valve: Manual drain valve for draining of irrigation system circuit piping.

### 1.4 CODES AND STANDARDS

- A. Plumbing code compliance: Comply with any applicable portions of the Utah state plumbing code pertaining to the selection of materials and the installation of irrigation systems.
- B. Water purveyor compliance: Comply with requirements of purveyor supplying water to the project.
- C. Any permits that are needed for the installation of construction of any work included under this contract, which are required by the authorities of jurisdiction, shall be obtained and paid for by the contractor following whatever ordinances, regulations and codes requiring the permits. If the authorities of the jurisdiction require inspection at said points of the installation, the contractor shall arrange for, and be present at, any such inspections.
- D. Additional work or furnishing of materials required due to inspection by the authorities of jurisdiction shall be furnished at no cost to the owner. If the specifications for this project and existing ordinances, regulations or codes are in conflict, the conflict shall be noted in writing by the contractor to the owner's authorized representative, and any necessary changes in work shall follow an established procedure for claims for extra compensation.

## 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Location of Sprinkler and Devices: Design location is approximate. Make minor adjustments necessary to avoid planting and obstructions such as signs and light standards.
- B. Minimum Water Coverage: Not less than:
  - 1. Turf Areas: 100 percent.
  - 2. Other Planting Areas: 100 percent.
- C. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.
  - 1. Pressure Piping: 150 psig (1035 kPa).
  - 2. Circuit and Drain Piping: 100 psig (690 kPa).

## 1.6 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data including pressure rating, rated capacity, settings, and electrical data of selected models for the following:
  - 1. Valves, including general-duty, underground, manual and automatic control, and quick-coupler types, and valve boxes.
  - 2. Sprinklers, including emitters, drip tubes, and devices.
  - 3. Wiring
  - 4. Pipe, including sleeves, lateral, supply, conduit and drain.
- C. Wiring diagrams for electrical controllers, valves, and devices.
- D. Maintenance data for inclusion in "Operating and Maintenance Manual" specified in Division 1 Section "Project Closeout" for the following:
  - 1. Pressure regulators.
  - 2. Automatic control valves.

- 3. Sprinklers.
- E. Irrigation Schedule: A monthly Irrigation Schedule shall be prepared that covers the initial 120-day plant establishment period and the typical long-term use period. This schedule shall consist of a table with the following information for each valve:
  - 1. Plant type (for example, turf, trees, low water use plants);
  - 2. Irrigation type (for example, sprinklers, drip, bubblers);
  - 3. Flow rate in gallons per minute;
  - 4. Precipitation rate in inches per hour (sprinklers only);
  - Run time in minutes per day;
  - 6. Number of water days per week, and
  - 7. Cycle time to avoid runoff.

The irrigation schedule shall rely on the estimated landscape water use calculations and shall be adjusted as necessary for irrigation efficiency, soil conditions, slope, and microclimate conditions. (See Appendix B)

- F. Water Use Efficiency Review: Following construction a Water Use Efficiency Review (Audit) will be conducted by a certified Landscape Irrigation Auditor. The auditor shall be independent of the contractor, design firm and owner / developer of the project. The water performance audit will verify that the irrigation system complies with the minimum standards required by this ordinance. The auditor shall furnish a certificate to the Owner, Landscape Architect and installer certifying compliance with the minimum distribution requirements and an irrigation schedule.
- G. Qualification Data: Certification of The Certified Irrigation Contractor employed by the Irrigation System installer.
- H. Mock ups: This contractor will provide a mockup of a three-valve manifold mockup prior to the pre-construction meeting.

### 1.7 QUALITY ASSURANCE

- A. Comply with requirements of authority with jurisdiction for irrigation systems.
- B. Installer Qualifications: Engage an experienced installer who has completed minimum of six (6) irrigation systems similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- C. Listing/Approval Stamp, Label, or Other Marking: On equipment, specialties, and accessories made to specified standards.
- D. Listing and Labeling: Equipment, specialties, and accessories that is listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.
  - Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- E. Product Options: Irrigation system piping, specialties, and accessories are based on specific types, manufacturers, and models indicated. Components with equal performance characteristics produced by other manufacturers may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by the Architect, unless noted "No Substitute". The burden of proof of

product equality is on the Contractor. Refer to Division 1 Section "Product Substitutions." No requests for substitutions will be reviewed after bids have been received by Owner.

#### 1.8 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Verify that irrigation system piping may be installed in compliance with original design and referenced standards.
- B. Site Information: Reports on subsurface condition investigations made during design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information.

## 1.9 SEQUENCING AND SCHEDULING

- A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Owner.
- B. Coordinate irrigation systems work with landscape work specified in Division 32 Section 329300
   Landscape Planting.

### 1.10 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below. Package them with protective covering for storage and label clearly describing contents.
  - 1. Quick Couplers: Furnish quantity of units equal to 10% of amount of each size installed, but not less than one (1).
  - 2. Sprinklers: Furnish quantity of units equal to 10% of amount of each type installed, but not less than ten (10).
  - 3. Valve Keys: Furnish quantity of tee-handle units equal to 25% of amount of each type keyoperated, control valve installed, but not less than two (2) each.
  - 4. Quick Coupler Hose Swivels: Furnish quantity of units equal to 25% of amount of each type quick coupler installed, but not less than two (2).
  - 5. Quick Coupler Operating Keys: Furnish quantity of units equal to 25% of amount of each type quick coupler installed, but not less than three (3).

#### 1.11 WARRANTY/GUARANTEE

A. During the period of one (1) year from and after the final acceptance of the completed irrigation system, the Contractor shall at his own expense, make all needed repairs or replacement due to defective workmanship or materials which in the judgment of the Owner or Owner's representative, shall become necessary during such period. If, within seven (7) calendar days after mailing of the written notice or verified communication by the Owner to the Contractor or his agent, requesting such repairs or replacement, the Contractor shall neglect to make repairs, Owner may make such repairs at the Contractor's expense. In the case of emergency where, in the judgment of the Owner, delay could cause serious loss, hazard or damage to persons or property, then repairs, replacement and security, both temporary and/or permanent, may be

- provided by such persons as the Owner may employ, after verbal communication with Contractor without notice being sent to the Contractor, and the Contractor shall pay all costs related thereto.
- B. The guarantee shall be in the form of a letter from the Contractor addressed to the Owner. The letter shall incorporate the language stated above and be signed by an authorized officer/agent or Owner of the Contractor.
- C. During the guarantee period, the Contractor will drain the system in the fall and put the system back into operation in the Spring. This work shall be done in the presence of the Owner's representative and maintenance personnel.

#### 1.12 RECORD DRAWINGS:

- A. Any deviation from plan layout should be indicated on the final "Record" Drawings. This Contractor shall make an exact measured and dimensioned drawing showing locations of all piping, wiring, control, valves and quick coupler valves.
- B. Record Drawings shall be furnished to the Landscape Architect at the time of Substantial Completion Inspection before a letter of Substantial Completion for the irrigation sprinkler system will be issued.
- C. The Contractor shall supply the Landscape Architect with record drawing information in AutoCadd format before final acceptance of the irrigation system.

## 1.13 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.
- B. Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends, both threaded or plain.
- C. Store and handle materials to prevent damage and deterioration.
- D. Provide secure, locked storage for valves, sprinkler heads, and similar components that cannot be immediately replaced, to prevent installation delays.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Gate Valves for Underground Installation:
    - a. American Darling Valve Div., American Cast Iron Pipe Co.
    - b. Clow Valve Co. Div., McWane, Inc.
    - c. Kennedy Valve Div., McWane, Inc.
    - d. Stockham Valves & Fittings, Inc.
    - e. Waterous Co.

- 2. Corporation Stops for Underground Installation
  - a. Ford Meter Box Co., Inc.
  - b. Hays Div., Romac Industries.
  - c. A.Y. McDonald Mfg. Co.
  - d. Mueller Co., Grinnell Corp.
- 3. Valves for Aboveground and Pit Installation
  - a. Grinnell Supply Sales Co., Grinnell Corp.
  - b. Nibco, Inc.
  - c. Stockham Valves & Fittings, Inc.
  - d. Walworth Co.
  - e. Watts Regulator Co.
- 4. Automatic Control Valves
  - a. Rain Bird Sprinkler Mfg. Corp.
  - b. Hunter Industries
- Control Valve Boxes
  - a. Ametek by Plymouth Products Div., AMETEK
  - b. Brooks Products, Inc., Polyplastics Div.
  - c. Carson Industries, inc.
  - d. DFW/HPI by Hefco Plastics, Inc.
  - e. National Diversified Sales, Inc.
- 6. Quick Couplers
  - a. Rain Bird Sprinkler Mfg. Corp.
  - b. Hunter Industries
- 7. Sprinklers
  - a. Rain Bird Sprinkler Mfg. Corp.
  - b. Hunter Industries.
- 8. Pipe
  - a. Pacific Western Extruded Plastics Co.
  - b. Eagle Pacific Industries, Inc.
  - c. J-M Manufacturing Company, Inc.

## 2.2 PIPES AND TUBES

- A. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube materials specified below are used.
- B. Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 1785, PVC 1120, Schedule 40, 160 psig (1100 kPa) minimum pressure rating for 3-inch (100-mm) and smaller sizes, with plain, threaded or bell ends.
  - 1. PVC Socket Fittings: Schedule 40: ASTM D 2466.
- C. Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 1785, PVC 1120 compound, Schedule 80.
  - 1. PVC Socket Fittings: Schedule 80: ASTM D 2467.
  - 2. PVC Threaded Fittings: Schedule 80: ASTM D 2464.
- D. PVC, Pressure-Rated Pipe: ASTM D 2241, PVC 1120 compound, SDR 21 Bell and Ring for pipe 4" and larger.
- E. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2241, PVC 1120 compound, SDR 21.

- F. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2467, Schedule 40, socket-type.
- G. Ductile Iron: Deep Socket Cast Iron Fittings: ASTM A536.
- H. Mechanical Joint: Mechanical Joint Steel Fittings: AWWA A21.10
- I. Galvanized Pipe: ASTM A 733, made of ASTM A 53/A53M or ASTM A 106/A106M standard weight seamless-steel pipe and fittings with thread ends. All galvanized material to be Domestic fabricated material.
- J. Barb Fittings: Spiral Barb Fittings for ½" and ¾" inlet sprinklers. Max operating pressure 80 psi and 8 gpm.

### 2.3 PIPE AND TUBE FITTINGS

- A. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube fitting materials specified below are used.
- B. Cast-Bronze Flanges: ASME B16.24, Class 150, raised ground face, bolt holes spot faced.
- C. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2467, Schedule 80, socket-type and ASTM D2464, Schedule 80, threaded fittings.
- D. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2467, Schedule 40, socket-type and ASTM D2464, Schedule 40, threaded fittings.
- E. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2241, PVC 1120 compound, SDR 21.
- F. Polyvinyl Chloride (PVC) Plastic Pipe Fittings: ASTM D2467, Schedule 40, socket-type.
- G. Ductile Iron: Deep Socket Cast Iron Fittings: ASTM A536.
- H. Mechanical Joint: Mechanical Joint Steel Fittings: AWWA A21.10
- I. Galvanized Pipe: ASTM A 733, made of ASTM A 53/A53M or ASTM A 106/A106M standard weight seamless-steel pipe and fittings with thread ends. All galvanized material to be Domestic fabricated material.
- J. Barb Fittings: Spiral Barb Fittings for ½" and ¾" inlet sprinklers. Max operating pressure 80 psi and 8 gpm.

## 2.4 JOINING MATERIALS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not included in this Section.
- B. Solvent Cement: ASTM F656 primer and ASTM D2564 solvent cement in color other than orange.
- C. Gaskets for Plastic Flanged Joints: Materials recommended by plastic pipe and fittings manufacturer.
- D. Gaskets for Plastic Joints: Trans gaskets as recommended the fittings manufacturer.

### 2.5 SWING JOINTS

A. All sprinkler heads shall be installed on a "swing joint" assembly. Lawn spray heads and small rotors with an inlet size 3/4" and smaller shall be installed as per manufacturer's recommendations with "funny pipe" and "swing ells" as manufactured by Rain Bird or approved equal. All large stream rotor and impact heads shall be installed with three 1" schedule 40 marlex street ells and one schedule 80 1"X12" nipple. Prefabricated swing joint assemblies by Spears Manufacturing or other approved equal can be substituted if desired. All "swing joint" configurations shall match detail drawings.

### 2.6 VALVES

- A. General: Valves are for general-duty and underground applications. Refer to "Valve Applications" Article for locations of various valve types specified in this Article. Refer to "Control Valves" Article for control valves and accessories and "Backflow Preventers" Article for backflow preventer valves.
- B. Nonrising Stem Gate Valves 3-inches (DN 80) and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings or AWWA C509, resilient seated; bronze stem, cast-iron, or ductile-iron body and bonnet, stem nut, 200 psig (1380 kPa) working pressure; and ends that fit NPS dimension, PVC pipe. Include elastomeric gaskets. All gate valves shall be domestic, resilient wedge gate valves.
- C. Valve Boxes: Cast-iron box with top section and cover with lettering "WATER," bottom section with base to fit over valve and barrel approximately 5-inches (127 mm) in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
  - 1. Provide steel tee-handle shutoff rod with each valve box. Include tee-handle, shutoff rod with one pointed end, stem of length to operate valve, and end fitting valve operating nut.
- D. Curb Stops 2-inches (DN 50) and Smaller: Bronze body, ground key plug or ball, 150 psig (1035 kPa) minimum pressure rating, wide tee head, with inlet and outlet to match service piping material.
- E. Service Boxes for Curb Stops: Cast-iron box with telescoping top section of length required for depth of bury of valve. Include cover with lettering "WATER" and bottom section with base of size to fit over curb stop and barrel approximately 3-inches (75 mm) in diameter.
  - Provide steel tee-handle shutoff rod with each service box. Include tee-handle, shutoff rod with one pointed end, stem of length to operate curb stop, and slotted end fitting curb stop head.
- F. Bronze, Nonrising Stem Gate Valves, 2-inches (DN 50) and Smaller: MSS SP-80, Type 1, solid wedge; nonrising, copper-silicon-alloy stem; Class 125, body and screw bonnet of ASTM B 62 cast bronze, with threaded or solder-joint ends. Include polytetrafluoroethylene (PTFE) impregnated packing, brass packing gland, and malleable-iron handwheel.
- G. Plastic Valves: Polyvinyl Chloride (PVC) Plastic, with 150 psig (1035 kPa) minimum pressure rating, ends compatible to piping where valve is to be installed, and tee handle.
- H. Ball Valves: Ball valves shall be solid bronze meeting Federal Specification WW-V-35C, TYPE II, COMPOSITION: BZ, STYLE: 3. Size shall be the same size as the main line on which it is installed. Valves shall be installed on the up-stream side of the electric remote control valve manifold and in the same valve box. NOTE: Only one (1) ball valve required per manifold.

- I. Quick-Couplers: Factory-fabricated, 2-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, ¾-11.5NH Threads for garden hose on outlet; and operating key.
  - 1. Locking Top Option: Include vandal-resistant, locking feature with two matching keys.
- J. Master Valve: Electric remote control operated valve. Class 125, Main valve and actuator cast iron ASTM A 126 class B. Master valve shall be provided with a manual-operating feature to enable valve to be opened manually or in case of power outage.
- K. Valve Bank Isolation: Provide a domestic brass ball valve with a minimum 200 psi rating. Valve shall be an Apollo model 70 series or approved equal.
- L. Flow Sensor/Flow Transmitter: Pre-installed in PVC tee or saddle mount. Flow rate 0.5 to 30 feet per second. Operates with two (2) wire system.
- M. Drain Valves: All drain valves shall be 3/4" brass full turn ball cocks and installed as per details on the Drawings. Valves shall be tested for 150 psi working pressure. This valve is to be installed on mainlines only.

#### 2.7 CONTROL VALVES

- A. Description: Manufacturer's standard control valves for circuits, of type and size indicated, and as follows:
  - 1. Provide cast-bronze bodies, unless otherwise indicated.
  - 2. Manual Control Valves: MSS SP-80, Class 125, globe valves.
  - 3. Key-Operated, Manual Control Valves: MSS Sp-80, Class 125, globe valves, fitted for key operation.
  - 4. Automatic Control Valves: Diaphragm-type, normally closed, with manual flow adjustment, and operated by 24-volt-a.c. solenoid.
  - 5. Automatic Drain Valves: Designed to open for drainage when line pressure drops below 3 psig (20 kPa). Not for use on pressure piping.
  - 6. Quick-Couplers: Factory-fabricated, 2-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH Threads for garden hose on outlet; and operating key.
    - a. Locking Top Option: Include vandal-resistant, locking feature with two matching keys.
- B. Control Valve boxes: Polyethylene (PE), acrylonitrile-butadiene-styrene (ABS), fiberglass, polymer concrete, or precast concrete box and cover. Size as required for application.
  - 1. Drainage Backfill: Cleaned gravel or crushed stone, graded form 3-inches (75 mm) maximum to <sup>3</sup>/<sub>4</sub>-inch (19 mm) minimum.
  - 2. Foundation: Provide a pressure treated foundation of 4"x4" lumber.
  - 3. Valve boxes shall be of sufficient size to house electric remote control valves with unions, and still allow room for maintenance without having to excavate or perform similar operations. Boxes shall have lock down lids and shall meet ASTM D638 for tensile strength of 4,300 pounds per square inch.
  - 4. No more than one valve shall be in each plastic valve box.

- C. Service Boxes for Key-Operated Control Valves: Cast-iron box with telescoping top section of length required for depth of bury of valve. Include cover with lettering "WATER," and bottom section with base of size to fit over curb stop and barrel approximately 3-inches (75 mm) in diameter.
  - 1. Include valve key, 36-inches (915 mm) long with tee handle and key end to fit valve.

### 2.8 SPRINKLERS

- A. Description: Manufacturer's standard sprinklers designed to provide uniform coverage over entire area of spray shown on Drawings at available water pressure, as follows:
  - 1. Housings: plastic, except where material is specified.
  - 2. Pop-up, Spray: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.
  - 3. Pop-up, Rotary Spray: Gear drive, full-circle and adjustable part-circle type.
  - 4. Bubblers: Fixed pattern, with screw type flow adjustment.

#### 2.9 AUTOMATIC CONTROL SYSTEM

- A. Description: Low-voltage controller system made for control of irrigation system automatic control valves. Controller operates on 120 volts a.c. building power system, provides 24 volts a.c. power to control valves.
- B. Exterior Control Enclosures: Weatherproof enclosure with locking cover and two matching keys. Enclosure construction complies with NFPA 70 and NEMA 250, Type 4, and includes provision for grounding.
  - 1. Material: Enameled-steel, sheet metal.
- C. Transformer: Internal-type, and suitable for converting 120 volts a.c. building power to 24 volts a.c. power.
- D. Controller Stations for Automatic Control Valves: Include switch for manual or automatic operation of each station.
- E. Timing Device: Adjustable, 24-hour, 14-day clock to operate any time of day. See Irrigation Schedule and Legend for model and manufacturer.
- F. Lightning Protection: Provide manufacturer's standard lightning protection on each controller. Coordinate with electrical.
- G. Wiring: UL 493, solid copper conductor, insulated cable, suitable for direct burial.
  - 2. Feeder Circuit Cables: Type UF, No. 14 AWG minimum, between valves and controllers.
  - 3. Control Wiring: Type PE 39, manufacture approved signal communication wire.
- H. Valve wire sizing chart: See Appendix A at end of section.

#### 2.10 IDENTIFICATION

A. Refer to Division 2 Section "Earthwork" for plastic underground warning tapes.

## 2.11 THRUST BLOCKS

A. All fittings adjacent to thrust blocks shall be wrapped in plastic sheeting to guard against interfering with any future disassembly of fitting or piping.

All main lines shall have a thrust block of poured concrete installed at each change of direction. The thrust block shall be of sufficient size for the pipe involved and rest on undisturbed ground. Construct as follows:

### STEP 1.

Multiply the working pressure by the appropriate value shown in the following table to obtain total thrust in N (lb.):

PIPELINE THRUST FACTORS \* ^

Pipe size		Dead end	90°	45°	22°
<u>in.</u>	<u>mm</u>	<u>or tee</u>	<u>elbow</u>	<u>elbow</u>	<u>elbow</u>
<u>in.</u> 3"	89	9.80	13.90	7.51	3.82
3 1/2"	102	12.80	18.10	9.81	4.99
4"	114	16.20	23.00	12.40	6.31
5"	141	24.70	35.00	18.90	9.63
6"	168	34.80	49.20	26.70	13.60
8"	219	59.00	83.50	45.20	23.00
10"	273	91.50	130.00	70.00	35.80
12"	324	129.00	182.00	98.50	50.30

<sup>\*</sup> Based on thrust per kPa (PSI) pressure.

## STEP 2.

Determine the bearing strength of the soil from the table below:

### BEARING STRENGTH OF SOILS

Soils and safe bearing loads	Ib/ft5	kPa
Sound shale	10,000	500
Cemented gravel and sand		
difficult to pick	4,000	200
Coarse and fine compact sand	3,000	150
Medium clay - can be spaded	2,000	100
Soft clay	1,000	50
Muck	0	0

See Soils Report for soil type

### STEP 3.

Blocking for cross may not be needed with long branch lines.

Divide the total thrust obtained in Step 1 by the bearing strength of the soil to get the area needed, m5(ft5).

### SIDE THRUST ALTERNATIVE PROCEDURE

Pipe size		Side thrust per deg	ree.
<u>in.</u> 3"	<u>mm</u>	<u>lb</u>	<u>N</u>
3"	89	17.10	76.10
3 1/2"	102	22.40	99.60
4"	114	28.30	125.90
5"	141	43.10	191.70
6"	168	60.80	270.50
8"	219	103.00	458.20
10"	273	160.00	711.70
12"	324	225.00	1,000.80

<sup>\*</sup> Based on side thrust per 689 kPa (100 PSI) pressure per degree of deflection.

NOTE: Multiply side thrust from table by degree of deflection times kPa (PSI) divided by 100 to obtain total side thrust in N(lb).

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Investigate and determine available water supply, water pressure and flow characteristics.
- B. Prior to installation of irrigation system, the contractor must verify the supply pressure at the work site. If there is a failure to obtain the needed pressure or if an excess pressure situation exists for normal operation, the contractor must contact the owner for any adjustments to the supply or irrigation system design. Failure to report any discrepancies in pressure due to any reason, and any installation done prior to notification of owner shall be done at the expense of the contractor.

### 3.2 PREPARATION

A. Set stakes or flags to identify proposed sprinkler locations. Obtain Architect's approval before excavation.

### 3.3 PAVING WORK

- A. Cutting and patching of asphalt paving is specified in Division 2 Section "Hot-Mixed Asphalt Paving."
- B. Cutting and patching of concrete paving is specified in Division 2 Section "Portland Cement Concrete Paving."
- C. Install piping in sleeves where crossing sidewalks, roadways, parking lots, and railroads.

## 3.4 PIPING APPLICATIONS

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and aboveground may be joined with flanges instead of joints indicated.
- B. Use pipe, tube, fittings, and joining methods according to the following applications.
- C. Pressure Piping Underground: Use the following:
  - 3-inches (DN 80) and Smaller: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type pipe fittings; and solventcemented joints.
  - 2. 4-inches (DN 80) and Larger: ASTM D 2241, Class 200, polyvinyl chloride (PVC) plastic pipe; with flanged or deep socket fittings.
- D. Circuit Piping: Use the following:
  - 1. All Sizes: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings; and solvent-cemented joints.
- E. Branches and Offsets at Sprinkler and Devices: ASTM D 1785, Schedule 80, polyvinyl chloride (PVC) plastic pipe with threaded ends; ASTM D 2464, Schedule 80, PVC plastic, threaded fittings; and threaded joints.
- F. Drain Piping: ASTM D 1485, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTSM D 2466, Schedule 40 PVC plastic, socket-type fittings; and solvent-cemented joints.
- G. Sleeves: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings; and solvent-cemented joints.

#### 3.5 JOINT CONSTRUCTION

- A. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.
- B. Threaded Joints: Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to valve ends into which pipes are being threaded.
- C. Polyvinyl Chloride (PVC) Piping Gasketed Joints: Construct joints between underground AWWA-type, cast-iron valves and NPS PVC pipe; with elastomeric seals that fit pipe diameter and valve ends; and lubricant, according to ASTM D 3139.
- Polyvinyl Chloride (PVC) Piping Solvent-Cemented Joints: Construction joints according to ASTM D 2672 and ASTM D 2855.
  - 1. Handling of Solvent Cements, Primers, and Cleaners: Comply with procedures in ASTM F 402 for safe handling when joining plastic pipe and fittings with solvent cements.
- E. Ductile Iron: Deep Socket Cast Iron Fittings shall be installed on all mainline pipe 3" or larger.

## 3.6 PIPING SYSTEMS – COMMON REQUIREMENTS

A. General Locations and Arrangements: Drawings indicated general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, and in other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

- B. Bedding material shall be placed a minimum of 6" in all directions around all main pressure line piping. Lateral line piping shall have a minimum of 3" of such bedding.
- C. Install piping at a uniform slope of 6-inches per 100-feet (1:200) minimum, down to drain points.
- D. Install components having pressure rating equal to or greater than system operating pressure.
- E. Install piping free of sags and bends.
- F. Locate groups of pipes parallel to each other, spaced a minimum of 6" apart to permit valve servicing or main and lateral line repair.
- G. Install fittings for changes in direction and branch connections.
- H. Piping Connections: Except as otherwise indicated make piping connections as specified below.
  - 1. Install unions, in piping 2-inches (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inch (DN 50) or smaller threaded pipe connection.
  - 2. Install flanges, in piping 2½-inches (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
  - 3. Install dielectric fittings to connect piping of dissimilar metals.

### 3.7 TRENCHES:

- A. Trenches shall be dug as wide and deep as necessary to properly place the sprinkling system according to the requirements herein. Any rock uncovered in this excavation shall not be left in the backfill. All excess rock shall be removed from the site by this Contractor and legally disposed of off the property. All trenches shall be backfilled and compacted to insure no settling of the surface, after the lawn is planted.
- B. If backfill soil is rocky or lumpy, protect the pipe and the pipe conduit with 8" of sand or loose, rock free, soil under, over and on sides of pipe. Avoid putting large rocks against pipe during backfilling operation.
- C. All trenches must be compacted to 90% in 6" lifts and watered in. Lines from control valves shall be installed after topsoil is in place and properly graded.
- D. This Contractor, in placing the sprinkling lines, etc., may uncover material not suitable for finished grading. This material shall be removed from the site by this Contractor. After the installation of the lines, the finished grading shall be smoothed over and restored to its original condition, using additional topsoil at this Contractor's expense, if this is necessary. The upper 6" of topsoil removed in the excavation of trenches for pipeline shall be conserved and kept separate from subsoil and reinstalled without mixing with other soil.
- E. Trenches where more than one pipe is to be installed, a distance of 6" is to be maintained between each pipe.
- F. All trenches are to be 12" away from all curbs, buildings and sidewalks. No exceptions.

#### 3.8 PIPING INSTALLATION

A. Install underground polyvinyl chloride (PVC) plastic pipe according to ASTM D 2774.

- B. After installation of piping, wires, and blocking, mainline shall be inspected by owner's representative before backfilling of trenches.
- C. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
  - 1. Slope circuit piping down toward drain valve minimum of ½-inch in 10-feet (1:240).
  - 2. Install polyvinyl chloride (PVC) plastic pipe in dry weather when temperature is above 40°F (4°C). Allow joints to cure at least 24-hours at temperature above 40°F (4°C) before testing, unless otherwise recommended by manufacturer.
- D. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel and crushed stone, graded from 3-inches (75 mm) to ¾-inch (19mm) minimum, drain material to 12-inches (300 mm) below grade. Cover drain material with sheet of ASTM D 226, Type II, asphalt-saturated felt and backfill remainder with excavated material. Drain pocket to be minimum six (6) cubic feet.
- E. Minimum Cover: Provide following minimum cover over top of buried piping:
  - 1. Pressure Piping: Greater depth of minimum of 24-inches below finished grade.
  - 2. Circuit Piping: 18-inches.
  - 3. Drain Piping: 18-inches.
  - 4. Sleeves: 24-inches.
- F. Install piping under sidewalks and paving in sleeves.
- G. All pipe threads shall be sealed with Teflon tape and pipe thread compound.
- H. Lines bordering fences, curbs, or sidewalks shall be held 8" away from such items to allow for maintenance and access.
- When connecting main pressure line PVC piping to galvanized steel piping in valve manifold, use a Harco coupling, Harco service tee, or mechanical joint repair sleeve with transition gaskets or other fittings as specified on drawings.

### 3.9 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, following requirements apply:
  - 1. Buried Valves 3-inches (DN 80) and Larger: AWWA, gate valves, non-rising stem, with stem nut and valve box.
  - 2. Buried Valves 2-inches (DN 50) and Smaller: Bronze-body, curb stop, with tee head, service box and shutoff rod.

### 3.10 VALVE INSTALLATION

- A. Valves: Install underground valves in valve boxes or pits.
  - 1. Install valves and polyvinyl chloride (PVC) pipe with restrained, gasketed joints.
- B. Curb Stops: Install underground curb stops in service boxes.

- C. Control and Ball Valves: Install in valve control valve boxes, arranged for easy adjustment and removal. Install unions with one (1) on upstream side at each valve manifold.
- D. Install pressure regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet and valved bypass where indicated.
- E. Master valve/flow meter combination unit shall be installed in valve boxes as per manufacturer specifications, drawings, and detail sheet.
- F. Control valves shall be located as close as possible to where shown on drawings. Avoid locating valves in areas of high pedestrian or vehicular traffic.
- G. Each bank or section of control valves, not in a pre-cast concrete box, shall be located in an adequate size plastic valve box and extensions as specified in section 2.4. Valve box shall be set at finish grade with top of valve stem 4" below top of box and 3" of pea gravel under valve to allow for drainage. Do not install more than one automatic valve per box.
- H. Provide isolation valve at all valve bank locations and as otherwise shown on drawings.

#### 3.11 SPRINKLER INSTALLATION

- A. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is complete.
  - 1. Install lawn sprinklers at manufacturer's recommended heights.
  - 2. Install shrubbery sprinklers at heights indicated.
  - 3. Locate part-circle sprinklers to maintain a minimum distance of 12-inches (400 mm) from walls and 2-inches (50 mm) from other boundaries, unless otherwise indicated.
- B. All sprinkler heads and valve boxes shall be set flush with finish grade unless otherwise specified. Contractor shall insure tops of heads and boxes remain at finish grade, and adjust as required. If any settlement occurs within the 1 year warranty period, the contractor will be required to place such areas back in satisfactory condition, using additional topsoil and new sod if necessary.

### 3.12 AUTOMATIC CONTROL SYSTEM INSTALLATION

- A. Run one extra wire from the adjacent controller to each group of valves for future use and stub into the valve box.
- B. Install control wiring in same trench with piping.

#### 3.13 CONTROL WIRING

- A. All connections to valves and all wire splices shall be watertight.
- B. Control wires must be buried at a minimum of 12" below finish grade and bundled with plastic tape every 25 feet. Tie a loose 20" loop at all valve box, pull boxes, and splice box locations. Wiring shall be enclosed in adequate size PVC electrical conduit.
- C. All splices shall be enclosed in a plastic valve box and noted on "as built" drawings.

D. Wires run in same trench as main pressure line or any other pipe shall be set a minimum of 4"from pipe to allow for maintenance access. Wire shall run parallel to pipe and not wrap around or go under pipe unless care is taken to allow clearance for maintenance access.

### 3.14 CONNECTIONS

- A. Connect piping to sprinklers, devices, valves, control valves, specialties, and accessories.
- B. Connect water supplies to irrigation systems. Include backflow preventers on potable water supplies. Include automatic filters on secondary water supplies.
- C. Electrical Connections: Connect to power source, controllers, and automatic control valves.
- I. Minimum requirements for electrical installations are specified in Division 26.
- J. Ground systems according to Division 26 Section "Grounding."

#### 3.15 FIELD QUALITY CONTROL

- A. Testing: Perform hydrostatic test of piping and valves before backfilling trenches. Piping may be tested in sections to expedite work.
  - Cap and subject the piping system to a static water pressure of 50 psig (345 kPa) above
    the operating pressure without exceeding pressure rating of piping system materials.
    Isolate test source and allow to stand for 4-hours. Leaks and loss in test pressure
    constitute defects that must be repaired.
  - 2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
  - 3. Notify Architect 24 hour in advance of pressure testing so test may be observed.

## 3.16 CLEANING AND ADJUSTING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Carefully adjust lawn sprinklers so they will be flush with, or not more than ½-inch (13 mm) above, finish grade after completion of landscape work.
- D. Adjust settings of controllers and automatic control valves.

### 3.17 COMMISSIONING

- A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturers, proceed as follows:
  - 1. Verify that specialty vales and their accessories have been installed correctly and operate correctly.
  - 2. Verify that specified test of piping are complete.

- 3. Check that sprinklers and devices are correct type.
- 4. Check that damaged sprinklers and devices have been replaced with new materials.
- 5. Check that potable water supplies have correct type backflow preventers.
- 6. Energize circuits to electrical equipment and devices.
- 7. Adjust operating controls.
- B. Operational Testing: Perform operational testing after hydrostatic testing is completed, backfill is in place, and sprinklers are adjusted to final position.
- C. Provide irrigation system layout and diagram in CADD format with water zones clearly identified. Layout to be color coded with a maximum of five (5) colors for easy legibility. Record water budget for each irrigation control zone and current settings. Provide laminated copy and mount near controller. Verify location with Architect.

#### 3.18 DEMONSTRATION

- A. Demonstrate to Architect that system meets coverage requirements and that automatic controls function properly.
- B. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information.
- C. Provide 7-days' written notice in advance of demonstration.
- D. System Operation Test / Substantial Completion Inspection:
  - During the Substantial Completion Inspection, the entire system, both electric and hydraulic, will be tested in the presence of the Landscape Architect, the Owner's representative and the General Contractor's Project Manager to insure COMPLETE coverage of all areas to be watered. This test must be performed by using a controller compatible, hand held radio. Any deficiencies identified at this time will require revisions by the Contractor at the Contractor's expense.

### 3.19 WINTERIZATION

A. It shall be the responsibility of the Contractor to winterize the system as required during the course of construction, each phase of construction and during the first Winter Period after the entire project has been accepted as Substantially Complete. All work shall be coordinated with and at the direction of the Owner's Representative. The Contractor shall be responsible to activate the system in the Spring to insure there are no problems. Start up and Shut down will be completed in the presence of the Owner's Representative. No Exceptions.

APPENDIX A
ALLOWABLE AVERAGE DISTANCES FROM CONTROLLER TO VALVES

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	ire Sizes								31 WATT									
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d	n		1	2	3 4	1	1	2	3 4		1	2	3 4		1	2	3 4	
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110V	16 16 16 14 14 14 12 12 10	16 14 12 14 12 10 12 10 10	1,670 2,050 2,400 2,660 3,260 3,810 4,230 5,190 6,720 8,260	830 1,020 1,200 1,330 1,630 1,900 2,110 2,590 3,360 4,130	550 680 800 880 1,080 1,270 1,410 1,730 2,240 2,750	410 510 600 660 810 950 1,050 1,290 1,680 2,010	1,910 2,350 2,740 3,040 3,730 4,350 4,830 5,930 7,660 9,420	950 1,170 1,370 1,520 1,860 2,170 2,410 2,960 3,830 4,710	630 780 910 1,010 1,240 1,450 1,610 1,970 2,550 3,140	470 580 680 760 930 1,080 1,200 1,480 1,910 2,350	5,400 6,630 7,740 8,570 10,500 12,280 13,640 16,750 21,680 26,620	2,700 3,310 3,870 4,280 5,250 6,140 6,820 8,370 10,800 13,300	1,800 2,210 2,580 2,850 3,500 4,090 4,540 5,580 7,220 8,870	1,350 1,650 1,930 2,140 2,620 3,070 3,400 4,180 5,420 6,650	2,360 4,160 4,860 5,380 6,610 7,710 8,570 10,520 13,620 16,720	1,180 2,080 2,430 2,690 3,300 3,850 4,280 5,260 6,810 8,360	780 1,380 1,620 1,790 2,200 2,570 2,850 3,500 4,540 5,570	590 1,040 1,210 1,340 1,650 1,920 2,140 2,630 3,400 4,180
115V	16 16 16 14 14 14 12 12 10	16 14 12 14 12 10 12 10 10 8	1,960 2,410 2,810 3,120 3,830 4,470 4,960 6,690 7,890 9,690	980 1,200 1,400 1,560 1,910 2,230 2,480 3,040 3,940 4,840	650 800 930 1,030 1,270 1,480 1,650 2,020 2,620 3,220	490 600 700 780 950 1,110 1,240 1,520 1,970 2,420	2,260 2,780 3,240 3,590 4,410 5,150 5,720 7,020 9,090 11,160	1,130 1,390 1,620 1,790 2,200 2,520 2,860 3,510 4,540 5,580	750 920 1,080 1,190 1,470 1,710 1,900 2,330 3,020 3,710	560 690 810 890 1,100 1,280 1,430 1,750 2,270 2,790	5,980 7,340 8,570 9,480 11,650 13,600 15,100 18,540 24,000 29,470	2,990 3,670 4,280 4,740 5,820 6,800 7,550 9,270 12,000 14,730	1,990 2,440 2,850 3,150 3,880 4,520 5,020 6,170 7,990 9,810	1,490 1,830 2,140 2,370 2,910 3,400 3,770 4,630 6,000 7,360	3,900 4,790 5,590 6,180 7,800 8,870 9,860 12,100 15,660 19,230	1,950 2,390 2,790 3,090 3,800 4,430 4,930 6,050 7,830 9,610	1,300 1,590 1,860 2,050 2,530 2,950 3,280 4,030 5,210 6,400	970 1,190 1,390 1,540 1,900 2,210 2,460 3,020 3,910 4,800
120V	16 16 16 14 14 14 12 12 10	16 14 12 14 12 10 12 10 10 8	2,170 2,660 3,110 3,440 4,230 4,940 5,490 6,730 8,720 10,710	1,080 1,330 1,550 1,720 2,110 2,470 2,740 3,360 4,360 5,350	720 880 1,030 1,140 1,410 1,640 1,830 2,240 2,900 3,570	540 660 770 860 1,050 1,230 1,370 1,680 2,180 2,670	2,510 3,090 3,600 4,000 4,900 5,720 6,360 7,800 10,100 12,400	1,250 1,540 1,800 2,000 2,450 2,860 3,180 3,900 5,050 6,200	830 1,030 1,200 1,330 1,630 1,900 2,120 2,600 3,360 4,130	620 770 900 1,000 1,220 1,430 1,590 1,950 2,520 3,100	6,394 7,850 9,170 10,140 12,450 14,540 16,140 19,820 25,660 31,500	3,190 3,920 4,580 5,070 6,220 7,270 8,070 9,910 12,830 15,750	2,130 2,710 3,050 3,380 4,150 4,840 5,380 6,600 8,550 10,500	1,590 1,960 2,290 2,530 3,110 3,630 4,030 4,950 6,410 7,870	4,240 5,200 6,070 6,720 8,260 9,640 10,720 13,150 17,020 20,900	2,120 2,600 3,030 3,360 4,130 4,820 5,360 6,570 8,510 10,450	1,410 1,730 2,020 2,240 2,750 3,210 3,570 4,380 5,670 6,960	1,060 1,300 1,510 1,680 2,060 2,410 2,680 3,280 4,250 5,220
125V	16 16 16 14 14 14 12 12 10	16 14 12 14 12 10 12 10 10	2,380 2,920 3,410 3,720 4,640 5,410 6,010 7,380 9,550 11,730	1,190 1,460 1,700 1,880 2,320 2,700 3,000 3,690 4,770 5,860	790 970 1,130 1,250 1,540 1,800 2,000 2,455 3,180 3,905	590 730 850 940 1,160 1,350 1,500 1,840 2,380 2,430	2,770 3,400 3,970 4,390 5,400 6,300 6,990 8,580 11,110 13,640	1,380 1,700 1,980 2,190 2,700 3,150 3,490 4,290 5,550 6,820	920 1,130 1,320 1,460 1,790 2,090 2,320 2,850 3,690 4,540	690 850 990 1,090 1,350 1,570 1,740 2,140 2,770 3,410	5,980 7,340 8,570 10,790 13,260 15,470 17,180 21,090 27,310 33,530	2,990 3,670 4,280 5,390 6,630 7,730 8,590 10,540 13,650 16,760	1,990 2,440 2,850 3,590 4,410 5,150 5,720 7,020 9,090 11,160	1,490 1,830 2,140 2,690 3,310 3,860 4,290 5,270 6,820 8,380	4,750 5,830 6,800 7,530 9,250 10,800 12,000 14,730 19,070 23,410	2,370 2,910 3,400 3,760 4,620 5,400 6,000 7,360 9,530 11,700	1,580 1,940 2,260 2,500 3,080 3,590 3,990 4,900 6,350 7,790	1,180 1,450 1,700 1,880 2,310 2,700 3,000 3,680 4,760 5,850

## **END OF SECTION 328400 - IRRIGATION SYSTEMS**

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#### SECTION 329250 - LANDSCAPE RESTORATION

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Remove and replace sod each day over the irrigation lateral lines. This must occur in a single day for each valve.
  - 2. Replanting unsatisfactory or damaged lawns caused by contractor's operations.
  - 3. Repair to existing irrigation systems damaged by contractor's operations.
  - 4. Install new sod as required where patching and tie in to existing turf in larger turf areas is required.
- B. Related Sections include the following:
  - 1. Section 017300 "Execution" for cutting and patching" for repair of paving, walks and curbs damaged by the Work.

### 1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Certification by product manufacturer that the following products supplied comply with requirements:
  - 1. Fertilizers.
- C. Certification of grass seed from sod vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
  - 1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.
  - 2. Certification of each seed mixture of the native seed mix, identifying sod source, including name and telephone number of supplier.

### 1.4 QUALITY ASSURANCE

- A. The Owner reserves the right to perform site inspections at any time before, during or after the landscape installation, and to require corrective measures if requirements of the specification are not met.
- B. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful grass establishment.
  - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that grass planting is in progress.
- C. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
- D. Landscape work shall be done by a single firm specializing in landscape construction work with minimum five (5) years' experience completing projects of similar size and complexity.
  - 1. Contractor to provide list of past projects completed during last three (3) years at time of first bid proposal.
- E. The Contractor shall provide the Owner's Project Manager and Architect with at least 24-hour notice prior to making a site observation request.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

## 1.6 COORDINATION AND SCHEDULING

- A. Planting Season: Sow lawn seed and install sod during normal planting seasons for type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.
- B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

## 1.7 GRADING

A. Examine the subgrade; verify the elevations of topsoil, planting mix or mulch. Observe the conditions under which work is to be performed, and notify the Landscape Architect of unsatisfactory conditions. Do not begin landscape work until unsatisfactory conditions have been improved.

### 1.8 EXCAVATION

A. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Landscape Architect before planting.

### 1.9 EXISTING UTILITIES

- A. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. The Contractor shall have the area "Blue Staked" prior to digging. It is the responsibility of the Contractor to repair or replace any damage caused by its workers at no expense to the Owner.
- B. Before planting, locate all underground utilities prior to digging. Do not place plants on or near utility lines. Obtain a digging permit first (see the General Conditions) and have the permit at the site.

#### 1.10 MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
  - 1. Sodded Lawns: Not less than 40 days after date of Substantial Completion.
- B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare eroded or damaged areas to produce a uniformly smooth lawn.
  - 1. Sod bare or damaged areas with same materials specified for lawns.
  - 2. Utilize existing irrigation systems to keep lawns uniformly moist to a depth of 4 inches.
  - 3. Water lawn at the minimum rate of 1 inch per week during spring and fall and 2" during the summer.
- C. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain following grass height:
  - 1. Mow grass from 3 to 4 inches high
- D. Guarantee a close-knit stand of grass by watering, mowing, re-grading and re-sodding eroded areas and otherwise maintaining lawn area to the satisfaction of the District Project Manager and Landscape Architect, until final acceptance. Any areas, which fail to show a thick, vigorous, healthy grass stand, shall be reseeded at Contractor's expense with the same seed or sod originally specified. Re-sod or reseed as directed by the District and as required during the establishment, maintenance, maintenance service and warranty periods until all affected areas are accepted by the Landscape Architect.
- E. Pre-fertilization: Apply fertilizer to soil and rake in 24 hours prior to planting sod.
  - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb. per 1000 sq. ft. of lawn area.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 8, a minimum of 2 percent organic material minimum, free of stones 1/4 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
  - 1. Topsoil Source: Topsoil shall be Imported onto the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
  - 2. Submit a topsoil report indicating Mechanical analysis, organic content, Ph, SAR and soluble salts.
  - 3. Topsoil to meet USU extension Topsoil Quality Guidelines for Landscaping.
  - 4. Topsoil for planting operations shall be imported onto the project site. Topsoil shall be friable, fertile, natural loam, or sandy loam. Topsoil shall have a similar mechanical analysis to the existing topsoil and shall be capable of sustaining vigorous plant growth. It shall be free of admixture of subsoil and shall be reasonable free of stones, lumps, clods of hard earth, plants or their roots sticks, or other extraneous matter. It shall not be used for planting operations in a frozen or muddy condition. Topsoil shall not contain more than 2% rock.

### 2.2 SOD

- A. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.
  - 1. Species: Provide sod of grass species and varieties, to match existing stand of grass.

### 2.3 COMMERCIAL FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb. per 1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 COORDINATION

A. The Contractor shall coordinate his work with other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

### 3.3 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

### 3.4 PLANTING SOIL PREPARATION

- A. Limit subgrade preparation to areas that will be planted in the immediate future.
- B. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1/2 inch in any dimension and sticks, roots, rubbish, and other extraneous matter.
- C. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.
- D. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.
  - 1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
  - 2. Allow for sod thickness in areas to be sodded.
- E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
- F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

#### 3.5 INSTALLATION OF TOPSOIL

- A. Prior to the installation of any topsoil, Contractor shall inspect the existing subgrade for compliance to the specifications regarding elevation, slope, grade and cleanliness. Any deficiency shall be reported to the District Project Manager and Landscape Architect. Work begun in any area will acknowledge acceptance of area for Landscape planting.
- B. When contract operations have been completed to a point where planting areas will not be disturbed, subgrade shall be cleaned free of waste material of all kinds. In all planted areas dig out all to weeds by their roots and remove from site. Scarify and pulverize the subgrade to a depth of not less than 6" inches to alleviate compaction resulting from construction activities. Scarification shall be completed in all areas that are to be planted, seeded or sodded.
- C. Spread the topsoil to a minimum depth of 6" in all lawn areas. Do not place topsoil over subgrade that is frozen or damp. Till or scarify subsoil to a depth of 3" prior to installing topsoil. Place topsoil just prior to seeding so as to discourage weed growth.
- D. Topsoil shall be rolled by a hand roller on small areas. After rolling at a weight of 150-200 pounds per linear foot of roller, the grade shall again be graded to the specified grade with a smooth

surface. Large areas shall be graded by passing a land plane in three different directions over the entire area to be planted.

#### 3.6 PREPARATION OF LAWN AREAS

- A. If new sod is to be installed adjacent to existing turf grass, the sub-contractor shall be required to use a sod cutter to cut the edge of the existing sod and create a clean, straight edge along the existing turf or sod repair area. No Exceptions.
- B. Limit lawn subgrade preparation to areas to be planted.
- C. The surface on which lawn is to be installed shall be firm and free of footprints, depressions or undulations of any kind. The surface shall be free of all rocks larger than ½" in diameter and all sticks, roots, rubbish, and other extraneous materials. If a crust has formed on the topsoil, it shall be loosened by raking prior to seeding.
- D. On all areas, use a fertilizer combination of 16-16-8 commercial fertilizer applied at the rate of four (4) pounds per 1000 sq. ft. and work into the top 2" of soil at least two (2) days before sowing grass sees. No fertilizer other than those types and quantities called for in these specifications shall be used on these planting without consent of the Landscape Architect. It shall be the responsibility of this Contractor to notify the Landscape Architect and Owner in writing three (3) days prior to fertilizing to provide visual verification of work. No exceptions.

# 3.7 SOD REPAIR

- A. Any areas of sod damaged during construction operations shall be repaired as follows:
  - Damage sod shall be removed with the use of a sod cutter to cut a clean straight edge in the exist turf. Meandering lines and small areas of sod removal less than 20 s.f. are not allowed.
  - 2. Install additional topsoil as required to repair the finish grade, roll, compact and rake as in subsection 3.2 and 3.4 above.
  - 3. No grade transitions between the new finish grade and the existing turf shall be allowed.

# 3.8 NEW SOD

- A. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.
- B. Only full-size rolls of sod are acceptable. Small pieces of sod repair are not acceptable and will be rejected.
- C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
  - 1. Lay sod across angle of slopes exceeding 1:3.
- D. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

## 3.9 SOD REMOVAL AND RESTORATION

- A. In all areas of irrigation removal and replacement, cut and remove the existing sod with a sod cutter. Remove the existing sod if not usable. If sections of the sod are usable, lay back adjacent to the area to be trenched for new valves, heads and lateral lines. After installation of the new valve, laterals and heads, compact the trench excavation to prevent settling. Install new sod the same day. No exceptions. BASE BID TO INCLUDE NEW SOD AT ALL IRRIGATION TRENCHES where sod is non viable.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
- C. Only full-size rolls of sod are acceptable. Small pieces of sod repair are not acceptable and will be rejected.
- D. Newly re-laid sod in all areas shall match the grade of the adjacent existing sod.

#### 3.10 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.
- C. During landscape work store materials and equipment where directed. Keep pavement clean and work area in an orderly condition.
- D. Protect landscape areas, work and materials from damage due to operations by other contractors and trades, trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.
- E. Keep the site free from accumulation of waste material. At the time of completion, all areas must be swept and washed clean and all rubbish removed to the satisfaction of the Landscape Architect.

END OF SECTION 329250

SECTION 329300 - LANDSCAPE PLANTING

PART 1 – GENERAL

#### 1.1 SUMMARY

- A. The extent of the landscaping development work is shown on the drawings and in schedules. This work includes:
  - 1. Obtaining and paying for permit fees, inspections and tests required for the installation of landscape planting.
  - 2. Providing and placement of all plant material, topsoil, mulch, sod, seed, miscellaneous materials and maintenance of landscape planting and associated guarantees.
  - Mow, water and maintain all of the existing turf with in the softball field, baseball field and soccer field area during the course of construction and until the end of the maintenance period specified.
  - 4. Attendance at Pre-Construction Conference.

# A. Related Requirements:

- 1. Section 011000 "Summary" for summary description of the Work.
- 2. Section 0123000 "Alternates" for description of applicable bid alternates.
- 3. Section 328400 "Irrigation Systems" for complete irrigation systems.

## 1.2 QUALITY ASSURANCE

- A. The District reserves the right to perform site inspections at any time before, during or after the landscape installation, and to require corrective measures if requirements of the specification are not met.
- B. Plants shall conform to names indicated on the drawings and plant list and to the nomenclature listed in the American Joint Committee on Horticultural Nomenclature's "Standardized Plant Names", latest edition.
- C. Size, quality, handling, planting and maintenance of plant materials shall be in accordance with "American Standard for Nursery Stock", ANSI Z60-1996, American Association of Nurserymen, Inc. Minimum acceptable sizes of plants, measured before pruning with branches in normal position, shall conform to measurements specified in the Plant Materials Key.
- D. Plants shall be subject to the Landscape Architect's inspection and approval at place of growth or upon delivery for conformity to specification requirements. Such approval shall neither preclude right of rejection upon delivery at the site or during progress of work, nor right of rejection at the site due to damage suffered in handling or transportation. Inspection of plants by the Landscape Architect before digging shall be at the option and expense of the Owner.
  - 1. All plant material will be inspected again at time of final inspection and once again at the end of the warranty period.
  - 2. Any plant material found to be unacceptable at any inspection shall be immediately removed and replaced.
  - 3. A tree or shrub planted in a single location may be removed and replaced more than one time during the establishment, maintenance, maintenance service and warranty periods.

- E. Unauthorized substitutions of plant material will not be accepted. All substitution requests must be made in writing and preferably before the bid due date.
- F. Contractor will provide and pay for materials testing. Testing agency shall be acceptable to the Landscape Architect.
  - 1. Test representative samples of materials proposed for use. Materials used in the work shall be the same materials as tested. Do not use proposed material in the work until test reports have been reviewed by the Landscape Architect and approval obtained to proceed with plant excavations.
- G. Test reports: Provide the following test information (format to follow "Topsoil Quality Guidelines for Landscaping" prepared by USU Extension with specific compost soil amendment guidelines.
  - 1. Imported Topsoil:
    - a. Mechanical analysis.
    - b. Percentage of organic content.
    - c. Recommendations on the type and quantity of soil nutrient additives required to bring nutrients to a satisfactory level for specified plants.
    - d. Recommendations on the type and quantity of soil additives required to bring the pH of soil to a value of 5.5-7.0 (unless otherwise noted).
    - e. SAR
    - f. Soluble Salts
  - 2. Existing Topsoil:

Provide a minimum of 4 separate tests, two (2) per field, to verify mechanical analysis, organic matter content, and nutrient level and pH value of topsoil. Sample locations as directed by the Landscape Architect.

- Compost:
  - a. Carbon Nitrogen ratio
  - b. Moisture content
  - c. Mechanical Analysis
  - d. Recommendations on the type and quantity of soil additives required to bring the pH of soil to a value of 5.5-7.0 (unless otherwise noted).
  - e. SAR
  - f. Soluble Salts
- H. Landscape work shall be done by a single firm specializing in landscape construction work with minimum 5 years' experience completing projects of similar size and complexity.
  - 1. Contractor to provide list of past projects completed during last 3 years at time of first bid proposal.
- I. The Contractor shall provide the District Project Manager and Architect with at least 24-hour notice prior to making a site observation request.

# 1.3 SUBMITTALS

A. General: Submit each item in this article and for each item listed in Part 2 – Materials for review and approval according to the General Conditions of the Contract and Specifications - Division 1.

- B. Submit Certificate of Inspection of plant material by state or federal authorities.
- C. Submit commercial soils test with material test reports and soil nutrient additive recommendations.
- D. Submit a label from the manufacturer's container certifying fertilizer content.
- E. Submit samples of proposed mulch for use in planting beds.
- F. Submit complete written maintenance instruction at least 10 days prior to end of maintenance period. Include all requirements for proper care, development and maintenance of planting.
- G. Submit within 20 days of award of the bid to general contractor a planting schedule stating sources from which said Contractor can provide the plant materials in the quantity and size indicated on the Drawings.
  - 1. Substitutions for plant material that is not obtainable may be proposed in writing prior to bid. Submit written statement from plant materials supplier(s) with proposal for equivalent material for evaluation and acceptance prior to bid.
- H. Submit contractor's Guarantee Form for Landscape Architect's review.
- I. Certification of grass seed of proposed sod: From seed vendor for each grass seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, percentage of purity, germination and weed seed. Include the year of production and date of packaging. Identify name and telephone number of supplier.
- J. Submit samples of the following products:
  - 1. Geotextile fabric under stone mulch and /or cobble.
  - 2. Pre-emergent herbicide

## 1.4 VERIFICATION OF DIMENSIONS AND QUANTITIES

- A. All scaled dimensions are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Landscape Architect of any discrepancy between the information on the Drawings and actual conditions, refraining from doing any work on said areas until given approval to do so by the Landscape Architect.
- B. Plant quantities listed on the Drawings are for the convenience of the Contractor only and are not guaranteed. All planting indicated on the Drawings will be required unless indicated otherwise.

# 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Prepare, transport and handle plants to ensure protection against injury. Cover all plants while transporting to the site.
- B. Deliver plants with legible waterproof identification labels.
- C. Temporary storage of new material:
  - 1. No new plants shall remain in temporary storage over the winter or summer. Plants that are not planted immediately shall be protected as follows:
    - a. Plants shall remain on the site of the work no longer than three days prior to being planted or placed in storage.

- b. The earth balls shall be kept moist and their solidity carefully preserved. To prevent drying out or freezing, store plants in a compact group with suitable mulch material placed around and between the balls so they are completely covered. The method of storage of plants and mulch material shall be acceptable to the Landscape Architect.
- c. Provide irrigation to stored plants.
- D. Do not deliver or use topsoil in frozen or muddy conditions.
- E. Packaged materials shall be delivered in factory labeled containers showing weight, content and manufacturer. Protect all materials from damage and deterioration during delivery and storage at site.
- F. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding."

## 1.6 GRADING

A. Examine the subgrade, verify the elevations of topsoil, planting mix or mulch. Observe the conditions under which work is to be performed, and notify the Landscape Architect of unsatisfactory conditions. Do not begin landscape work until unsatisfactory conditions have been improved.

# 1.7 EXCAVATION

A. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Landscape Architect before planting.

#### 1.8 EXISTING UTILITIES

- A. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. The Contractor shall have the area "Blue Staked" prior to digging. It is the responsibility of the Contractor to repair or replace any damage caused by its workers at no expense to the Owner.
- B. Before planting, locate all underground utilities prior to digging. Do not place plants on or near utility lines. Obtain a digging permit first (see the General Conditions) and have the permit at the site.

# 1.9 PLANTING SCHEDULE

- A. Before bidding each bidder shall investigate sources of supply and determine availability of all plants specified on the planting list in size, variety and quantity. Failure to take this precaution will not relieve the successful bidder from responsibility as a contractor to furnish and install all plant material in strict accordance with the contract without additional expense to the Owner.
- B. Prepare a proposed planting schedule for approval by the Landscape Architect. Schedule the dates for each type of landscape work during the normal seasons for such work in the area of the site. Correlate with specified maintenance periods to provide maintenance throughout the specified time period. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

- C. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.
  - 1. Planting Restrictions: Coordinate planting periods with maintenance periods to provide required maintenance from date of planting until the date of Substantial Completion.
  - 2. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

## 1.10 ESTABLISHMENT, MAINTENANCE, REPLACEMENT, AND GUARANTEE

- A. The establishment period shall begin at the time that the planting phase of the work is completed, inspection and written notice is given and shall continue until the date of substantial completion. See Article "Total Site Maintenance" below.
- B. Maintenance shall include but not be limited to watering, weeding, pruning, spraying, adjusting of guys, and lawn maintenance as described herein.
- C. Remove and replace all trees within a two-week period that are found to be unacceptable at the time of substantial completion and at any time during the guarantee period. Replacements shall be made during the guarantee period. Replacements shall be made during the growing season and shall comply with all requirements and specifications. Replacement shall also match specified trees in specie, size, and condition. Any delay in the completion of any type of landscape planting operations which extends the planting into more than one season shall extend the guarantee period and the warranty service period accordingly.
- D. Any sod that settles below or rise above the desired finished grades during establishment or guarantee period shall be reset at the proper grades.
- E. Guarantee a close knit stand of grass by watering, mowing, regrading and re-sodding eroded areas and otherwise maintaining lawn area to the satisfaction of the Owner and Landscape Architect, until the date final acceptance. Any areas, which fail to show a thick, vigorous, healthy grass stand, shall be re-sodded at Contractor's expense with the same seed or sod originally specified. Re-sod as required until all affected areas are accepted by the Landscape Architect.
- F. Guarantee all planting for one year following signature of Owner on the final contract payment application.
- G. The Contractor will not be responsible for plants destroyed or lost due to occupancy of the project, or vandalism on the parts of others or if the failure of any plant material can be proven to the Landscape Architect to be beyond the control of the Contractor.
- H. At the end of the guarantee period a final inspection of all planting included in this contract will be made by the Landscape Architect. At that time any plant found not to be in a healthy growing condition, broken, damaged, or not exhibiting the desired characteristics of the plant shall be noted. These noted plants shall be removed as specified above.

#### PART 2 - MATERIALS

## 2.1 TOPSOIL

A. Topsoil for planting operations shall be imported on the project site. It shall be friable, fertile, loam or sandy loam containing at least 2% organic matter. PH range shall be 5.5 to 8.2 inclusive, shall

be capable of sustaining vigorous plant growth. It shall be free of admixture of subsoil and shall be reasonable free of stones, lumps, clods of hard earth, plants or their roots sticks, or other extraneous matter. Topsoil shall conform to the following standards:

1.	Soluble Salts (dS/m or mmho/cm)	<4
2.	PH	5.0-8.2
3.	% Sand	<70
4.	% Silt	<70
5.	% Clay	<30
6.	Organic Matter	≥1.0
7.	% Course fragments	<5.0
8.	SAR	<7

- 9. Soil shall not contain more than two percent by volume of rocks. All rocks greater than 3/8" shall be screened and removed from the on-site topsoil prior to use. All roots, plants and any other material over 3/8 " in any dimension shall be screened out of the topsoil prior to use or reuse in lawn and landscape areas.
- B. Topsoil shall meet USU Topsoil Quality Guidelines for Landscaping. Topsoil that does not meet the Guidelines shall be amended until the guidelines are met.
- C. Topsoil shall be free of admixture of subsoil and shall be reasonable free of stones, lumps, clods of hard earth, plants or their roots sticks, or other extraneous matter.
- D. Prior to import of topsoil to the site, the Contractor shall furnish commercial soil tests of the existing top soil and proposed top soil material for Landscape Architect's approval. Any material imported onto the site without approved submittal and testing shall be replaced with topsoil which shall conform to the specifications at no additional compensation to the Contractor.
- E. Topsoil shall not be used for planting operations while in a frozen or muddy condition.

# 2.2 ORGANIC SOIL AMENDMENT

- A. Compost: Well composted, stable and weed free organic matter, pH range of 5.5 to 8" moisture content 35 to 55 by weight; 100 percent passing through a ¼" sieve; soluble content of 5 to 10 decisiemens/m; not exceeding .5 percent inert contaminants and free of substances toxic to planting.
- B. Compost to meet USU extension Compost Quality Guidelines for Landscaping.
- C. Organic soil amendments (compost) shall be composted and nitrogen stabilized by one of the following manufacturers:
  - 1. Soil-pep by Mt. West Products, Rexburg, Idaho
  - 2. Replenish Products,
  - 3. Nutrimulch, Moroni, Utah

## 2.3 INORGANIC SOIL AMENDMENTS

A. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (.425-mm) sieve.

## 2.4 ORGANIC SOIL CONDITIONER

A. Organic soil conditioner shall be composted and nitrogen stabilized Soil-pep by Mt. West Products, Rexburg, Idaho.

#### 2.5 PEAT MOSS

- A. Peat moss used in planting soil preparation: High quality pure Canadian sphagnum peat with a pH value not less than 3.5 nor greater than 6.0 at 25 degrees C. The ash content shall be not more than 10% and water holding capacity shall be not less than 800%.
- B. All peat shall comply with Q-P-166e, Class B coarseness.

## 2.6 BACKFILL

A. Backfill soil mixture shall be the following materials well mixed in the specified proportions, which are by volume.

Product	Proportion
Peat moss or organic soil conditioner	1 part
Topsoil	4 parts

## 2.7 COMMERCIAL FERTILIZER – LAWNS

A. Fertilizer for lawns shall be commercial fertilizer, uniform in composition, dry and free flowing. It shall contain the following percentage by weight: 16% of nitrogen, 16% of phosphoric acid, 8% of potash. Fertilizer shall be delivered mixed as specified in standard-sized bags, showing weight, analysis of content, and name of manufacturer as required by state regulations. If soil tests recommend variance from these percentages obtain Landscape Architect's approval prior to applications.

## 2.8 WEED BARRIER FABRIC

A. Fabric shall be UV resistant, woven spunbond needle punch, polyproplene, wt. 5 oz, per square yard, color black. Use Typar or Dewitt Pro 5 Weed Barrier.

# 2.9 DRY SOIL AMENDMENT

A. Root-Maxx Plus by Bio-plex (1-800 444-3573) or approved equal. Add to amended planting soil at rate of 1 lb. per 50 cy.

## 2.10 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

- B. Sod shall be cultivated sod, free of weeds and undesirable grasses, machine cut to supplier's standard width and length and 5/8" thick. Measurement for thickness shall exclude top growth and thatch. Blend of grasses shall contain Kentucky Bluegrass and Perennial Ryegrass and shall be of good texture, free from noxious roots, stones and foreign materials. The sod shall be nursery grown sand based sod, and shall be well rooted one (1) year old growth of permanent and desirable grasses, suitable for growth in the general location of the project
  - 1. Selected sod suppliers and products shall include:

a. Biograss: Bio Play (801) 562-9090
 b. Chanshire: Royal Blue (866) 763-3279
 c. All American Sod: American Blue (801) 227-7800

- 2. Each sod supplier to provide a minimum of five (5) project references with contacts for the specified sand based sod.
- 3. A loam based sod to be installed in general repair areas.
- 4. A sand based sod to be installed over new land drains as shown on the drawings.

# 2.11 HERBICIDE

- A. Contact Herbicide; Round-up or approved equal.
- B. Pre-emergent herbicide; Poast or approved equal

## 2.12 WATER

A. Potable water

#### PART 3 - EXECUTION

## 3.1 COORDINATION

A. The contractor shall coordinate his work with other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

# 3.2 INSTALLATION OF TOPSOIL

- A. Prior to the installation of any topsoil, Contractor shall inspect the existing subgrade for compliance to the specifications regarding elevation, slope, grade and cleanliness. Any deficiency shall be reported to the Landscape Architect. Work begun in any area will acknowledge acceptance of area for Landscape planting.
- B. When contract operations have been completed to a point where planting areas will not be disturbed, subgrade shall be cleaned free of waste material of all kinds. In all planted areas dig out all to weeds by their roots and remove from site. Scarify and pulverize the subgrade to a depth of not less than 6" inches. Scarification shall be completed in all areas that are to be planted, or sodded.
- C. Spread the topsoil to a minimum depth of 12" in planting beds and ground cover areas allowing for 6" of stone mulch.

- D. Spread the topsoil and till to a minimum depth of 6" in all lawn areas. Do not place topsoil over subgrade that is frozen or damp. Place topsoil just prior to seeding so as to discourage weed growth.
- E. Topsoil shall be rolled by a hand roller on small areas. After rolling at a weight of 150-200 pounds per linear foot of roller, the grade shall again be graded to the specified grade with a smooth surface. Large areas shall be graded by passing a land plane in three different directions over the entire area to be planted.
- F. Surface drainage shall be insured, and if shown, shall be directed in the manner indicated on the Drawings by molding the surface to facilitate the run-off water. Fill low spots and pockets with topsoil and grade to drain properly.
- G. The finish grade of the topsoil adjacent to all sidewalks, mow strips, etc., and prior to planting shall be 1" below the top surface of adjacent pavement or hard surface of any kind.
- H. The Landscape Architect shall approve the finish grading prior to application of seed, sod or plant material. Make minor adjustments to finish grades at the direction of the Landscape Architect.

#### 3.3 WEED BARRIER FABRIC

A. Install weed barrier fabric as per manufacturer's recommendation.

## 3.4 PREPARATION OF LAWN AREAS

- A. The surface on which lawn is to be installed shall be firm and free of footprints, depressions or undulations of any kind. The surface shall be free of all rocks larger than 1/2" in diameter and all sticks, roots, rubbish, and other extraneous materials.
- B. If a crust has formed on the topsoil, it shall be loosened by raking prior to seeding.
- C. Apply fertilizer directly to subgrade before loosening.
- D. Spread topsoil and fertilizer on surface, and thoroughly blend.
- E. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
- F. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
- G. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
- H. Loosen surface soil to a depth of at least of 6 inches. Apply fertilizers according to topsoil report. Till soil to a homogeneous mixture of fine texture.
- I. Remove stones larger than 1/2 inch in any dimension and sticks, roots, trash, and other extraneous matter.
- J. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- K. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

- L. The surface shall be smooth and loose and of uniformly fine texture immediately before seeding. Prepare only enough ground that can be seeded within 24 hours thereafter.
- M. No seeding shall be done after a rain, of if the surface has been compacted, without first loosening the surface of the ground.
- N. On all areas, use a fertilizer combination of 16-16-8 commercial fertilizer applied at the rate of fifteen (15) pounds per 1000 sq. ft. and work into the top 2" of soil at least two (2) days before sowing grass sees. No fertilizer other than those types and quantities called for in these specifications shall be used on these planting without consent of the Landscape Architect. It shall be the responsibility of this Contractor to notify the Landscape Architect and Owner in writing three (3) days prior to fertilizing to provide visual verification of work.

#### 3.5 SODDING

- A. Place sod in locations shown only after fine grading has been completed. The top soil and sub-base shall be moist enough to resist shifting and have one (1) application of commercial fertilizer 16-16-8 at the rate of 3 lbs. per 1,000 sq. ft. just prior to the laying of the sod.
- B. Sod may be placed at any time when the ground is not frozen. Sod shall be cut and laid on site within a 48-hour period following harvest. The surface on which the sod is to be laid should be firm and free from footprints or other depressions. A string or line of boards may be used as a guide for setting the first line of sod across the area. Sod of the next course is matched against the edge of this first line in such a way the joints between the individual sod pieces in the two lines do not coincide. Successive courses are matched against the last line laid, in the same manner.
- C. The joints shall be closely laid and filled with a mixture of grass seed and screened topsoil at the rate of two (2) pounds of seed to each cubic yard of topsoil. It shall be thoroughly tamped to a true and even surface at the required finished grade.
- D. Slopes greater than 1:3 should be staked down by driving a wooden peg through the sod. Always lay sod across slope. Wire stakes shall not be used for pegging sod.
- E. Roll firmly but lightly, tamp with suitable wooden or metal tamper, all new sod sufficiently to set or press sod into underlying soil.
- F. Upon completion of sodding and filling voids with soil, the sod is to be completely saturated with water. Watering of the sod shall be the complete responsibility of the Contractor by whatever means necessary to establish a vigorous growing lawn.
- G. The grass shall be mowed before it exceeds two (2") in height. The grass will be cut to not less than 1 ¼" and during the establishment and maintenance period the lawn shall not exceed two (2") in height. Lawn clippings that remain on the lawn surface longer than 4 days shall be removed and disposed of properly.
- H. Protection of the newly laid sod shall be the complete responsibility of the Contractor. Provide acceptable visual barriers by means of barricades set at appropriate distances and strings or tapes between the barriers as an indication of new work. Restore any damaged areas caused by others, erosion or vehicular traffic until such a time as the lawn is accepted by the Owner.
- After the sod is established, apply one application of broadleaf weed control and one application of fertilizer.

## 3.6 SOD REPAIR

- A. Any areas of sod damaged during construction operations shall be repaired as follows:
  - 1. Damage sod shall be removed with the use of a sod cutter to cut a clean straight edge in the exist turf. Meandering lines and small areas of sod removal less than 20 s.f. are not allowed.
  - 2. Install additional topsoil as required to repair the finish grade, roll, compact and rake as in subsection 3.2 and 3.4 above.
  - 3. No grade transitions between the new finish grade and the existing turf shall be allowed.

#### 3.7 CLEAN UP AND PROTECTION

- A. During landscape work store materials and equipment where directed. Keep pavement clean and work area in an orderly condition.
- B. Protect landscape areas, work and materials from damage due to operations by other contractors and trades, trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.
- C. Keep the site free from accumulation of waste material. At the time of completion, all areas must be swept and washed clean and all rubbish removed to the satisfaction of the Landscape Architect.
- D. Temporary occupancy of the project shall not relieve the contractor of any of the obligations enumerated in the Contract Documents.

## 3.8 TOTAL SITE MAINTENANCE

- A. As part of this Contract, this Contractor shall be responsible for the continuous maintenance of all landscape areas within the Contract Limits, i.e., weeding, watering, mowing, fertilization, etc. from the time that each section of lawn from the beginning of construction thru the time that turf is required to be planted until October 1, 2021 at which time the field maintenance will be assumed by the District. If any lawn area or area of landscape planting is deemed not to be acceptable by the above date, liquidated damages may apply and additional required maintenance shall be provided by this contract at no additional cost to the Owner until said area has been established and is accepted by the Owner. Maintenance shall include the following:
  - 1. Re-sodding and extending the maintenance period beyond the 1st of October.
  - 2. Additional fertilization operations
  - Additional moving operations
  - 4. Additional specific watering operations
  - 5. Weed control measures
  - 6. Aerating operations
- B. Maintain plants in a vigorous, thriving condition by watering, cultivating, weeding, pruning, spraying and other necessary operations. No trees or shrubs will be accepted unless they are healthy and show satisfactory foliage conditions. Plants shall be maintained through the length of the total site maintenance period.
  - 1. All planted areas shall be cultivated at least every two (2) weeks and raked smooth, to present a neat appearance.
  - 2. Spray as required to keep plant materials free of disease and insects.
- C. The Contractor shall instruct the Owner as to the watering requirements and shall monitor such operations at all times. The Contractor shall be held responsible for failure to monitor the watering

requirements and shall be held responsible to replace any or all plants that are lost due to improper application of water.

- D. Lawns shall be maintained for as much time as necessary to establish over the entire lawn a close stand of grass of the varieties specified, free of weeds and undesirable coarse, native grasses, but in no case less than two (2) growing months or eight (8) mowings after substantial completion of landscape and irrigation work.
- E. All lawns shall be fertilized every three (3) weeks with six (2) pounds of 16-16-8 commercial fertilizer per 1000 sq. ft. until the end of the maintenance period required. It shall be the responsibility of this Contractor to notify the Landscape Architect and Owner in writing 48 hours prior to fertilizing to provide visual verification of work.
- F. Maintenance shall include, in addition to the above, cleaning, edging and repair to erosion and all other necessary work of maintenance. Sidewalks and other paved areas shall be kept clean when planting and maintenance are in progress.
- G. Any and all sprinkler lines broken or disrupted during the construction and maintenance period shall be replaced to proper working order and be acceptable to the Owner.
- H. Aerating operations: This contract will include a minimum of one aeration of the sod. Aeration will occur on or around the 15<sup>th</sup> of September.

#### 3.9 FINAL INSPECTION AND ACCEPTANCE

- A. Inspection will be made of the entire site periodically and at the conclusion of the maintenance period required.
- B. The landscape work may be inspected for acceptance in parts agreeable to the Landscape Architect, provided the work offered for inspection is complete, including maintenance and that the area comprises one unit or area of substantial size.
- C. Written notice requesting final inspection shall be submitted to the Landscape Architect at least ten (10) days prior to the anticipated inspection date.
- D. Where inspected landscape work does not comply with the requirement, replace rejected work and continue specified maintenance until re-inspected by the Landscape Architect and found to be acceptable. Remove rejected plants and materials promptly from the project site.
- E. Final Acceptance: The work under this contract will be accepted upon written approval by the Landscape Architect and the Owner, on the satisfactory completion of all work, including maintenance.
- F. All work done under this contract shall be left in good order to the satisfaction of the Owner and the Landscape Architect and the Contractor shall without additional expense, replace any trees, etc. which develop defects or die within one year of the substantial completion.
  - 1. A written guarantee that covers the above provisions shall be signed by the Contractor and delivered to the Landscape Architect upon acceptance of the work.
  - 2. The guarantee shall not be binding upon the Contractor if any failure should be proved to the satisfaction of the Landscape Architect to result from circumstances or negligence of parties over whom the Contractor has no control.

## 3.10 RECORD DRAWINGS

# Ogden High School Baseball Field Renovation Ogden School District

MHTN Project No. 2022539 Construction Documents - 18 August 2022

A. Record Drawings shall be furnished to the Landscape Architect at the time of the substantial completion inspection before a letter documenting Substantial Completion for the landscape planting will be issued. This information shall be permanently recorded on a reproducible 2 mil Mylar original which shall be given to the Landscape Architect before the project is accepted. The mylar shall be a copy of the original plans for the project produced by a local printer at the Contractor's expense.

END OF SECTION 329300

## SECTION 330500 - COMMON WORK RESULTS FOR UTILITIES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping joining materials.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Sleeves.
  - 5. Identification devices.
  - 6. Grout.
  - 7. Flowable fill.
  - 8. Piped utility demolition.
  - 9. Piping system common requirements.
  - 10. Equipment installation common requirements.
  - 11. Painting.
  - 12. Concrete bases.
  - 13. Metal supports and anchorages.

# 1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. PVC: Polyvinyl chloride plastic.
- D. DI: Ductile Iron pipe

# 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Dielectric fittings.
  - 2. Identification devices.
- B. Welding certificates.

## 1.5 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

#### 1.7 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Division 03.

## PART 2 - PRODUCTS

# 2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- E. Solvent Cements for Joining Plastic Piping:
  - 1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

F. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

#### 2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 and Smaller:
  - 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
  - 2. Aboveground Piping: Specified piping system fitting.
- C. AWWA Transition Couplings NPS 2 and Larger:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cascade Waterworks Mfg. Co.
    - b. Dresser, Inc.; DMD Div.
    - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
    - d. JCM Industries.
    - e. Smith-Blair, Inc.
    - f. Viking Johnson.
  - 3. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- D. Plastic-to-Metal Transition Fittings:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Spears Manufacturing Co.
  - 3. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
- E. Plastic-to-Metal Transition Unions:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Colonial Engineering, Inc.
    - b. NIBCO INC.
    - c. Spears Manufacturing Co.

- F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cascade Waterworks Mfg. Co.
    - b. Fernco, Inc.
    - c. Mission Rubber Company.
    - d. Plastic Oddities.
- G. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

# 2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

#### B. Dielectric Unions:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Capitol Manufacturing Co.
  - b. Central Plastics Company.
  - c. Epco Sales, Inc.
  - d. Hart Industries, International, Inc.
  - e. Watts Water Technologies, Inc.
  - f. Zurn Plumbing Products Group; Wilkins Div.
- 3. Description: Factory fabricated, union, NPS 2 and smaller.
  - a. Pressure Rating: 150 psig minimum.

# C. Dielectric Flanges:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Capitol Manufacturing Co.
  - b. Central Plastics Company.
  - c. Epco Sales, Inc.
  - d. Watts Water Technologies, Inc.

- 3. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
  - a. Pressure Rating: 175 psig minimum.

# D. Dielectric-Flange Kits:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Advance Products & Systems, Inc.
  - b. Calpico, Inc.
  - c. Central Plastics Company.
  - d. Pipeline Seal and Insulator, Inc.
- 3. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.
  - a. Pressure Rating: 150 psig minimum.
  - b. Gasket: Neoprene or phenolic.
  - c. Bolt Sleeves: Phenolic or polyethylene.
  - d. Washers: Phenolic with steel backing washers.

# E. Dielectric Couplings:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Calpico, Inc.
  - b. Lochinvar Corporation.
- 3. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
  - a. Pressure Rating: 300 psig at 225 deg F
  - b. End Connections: Threaded.

## F. Dielectric Nipples:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Perfection Corporation.
  - b. Precision Plumbing Products, Inc.
  - c. Victaulic Company.

- 3. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
  - a. Pressure Rating: 300 psig at 225 deg F.
  - b. End Connections: Threaded or grooved.

## 2.4 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

#### 2.5 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other Division 33 Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
  - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
  - 2. Location: Accessible and visible.

#### 2.6 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## 2.7 FLOWABLE FILL

- A. Description: Low-strength-concrete, flowable-slurry mix.
  - 1. Cement: ASTM C 150, Type I, portland.

- 2. Density: 115- to 145-lb/cu. ft.
- 3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
- 4. Aggregates: ASTM C 33, natural sand, fine.
- 5. Admixture: ASTM C 618, fly-ash mineral.
- 6. Water: Comply with ASTM C 94/C 94M.
- 7. Strength: 100 to 200 psig at 28 days.

## PART 3 - EXECUTION

#### 3.1 PIPED UTILITY DEMOLITION

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
  - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
  - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

# 3.2 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric unions.
  - 2. NPS 2-1/2 to NPS 12: Dielectric flanges or dielectric flange kits.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples or nipples.
  - 2. NPS 2-1/2 to NPS 4: Dielectric nipples.
  - 3. NPS 2-1/2 to NPS 8: Dielectric nipples or dielectric flange kits.
  - 4. NPS 10 and NPS 12: Dielectric flange kits.

# 3.3 PIPING INSTALLATION

A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.

- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Sleeves are not required for core-drilled holes.
- J. Permanent sleeves are not required for holes formed by removable PE sleeves.
- K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
    - a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6.
- L. Verify final equipment locations for roughing-in.
- M. Refer to equipment specifications in other Sections for roughing-in requirements.

## 3.4 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

- 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
- K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
  - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

## 3.5 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

- 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
- 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
- 3. Install dielectric fittings at connections of dissimilar metal pipes.

## 3.6 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

#### 3.7 PAINTING

- A. Painting of piped utility systems, equipment, and components is specified in Division 09 painting Sections.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

#### 3.8 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
  - 1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping. Place direct bury marker 12-18 inches above top of pipe but not less than 12-inches below finish grade.

#### 3.9 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

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END OF SECTION 330500

#### SECTION 331100 - WATER UTILITY PIPING

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

# B. Codes and Standards:

- 1. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of potable water system materials and products.
- 2. Water Purveyor Compliance: Comply with requirements of Purveyor supplying water to project, obtain required permits and inspections.
- 3. NFPA Compliance: Install fire water systems in accordance with NFPA 24 "Standard for Installation of Private Fire Service Mains and Their Appurtenances".
- 4. Local Fire Department/Marshall Regulations: Comply with governing regulations pertaining to hydrants, including hose unit threading and similar matching of connections.
- 5. UL Compliance: Provide fire hydrants that comply with UL 246 "Hydrants for Fire-Protection Service", and are listed by UL.

#### 1.2 SUMMARY

- A. This Section includes pressure water pipes and fire systems outside the building, with the following components:
  - 1. Special fittings for expansion and deflection.
  - 2. Pipes and valves.
  - 3. Fire Hydrants.

## 1.3 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. DI: Ductile Iron pressure pipe.

## 1.4 PERFORMANCE REQUIREMENTS

A. Pressure Rating: 175 psi static water pressure for all pipes and fittings. Pipe joints shall be water tight.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - Special pipe fittings.

- 2. Fire hydrants
- 3. Valves.
- 4. Valve boxes and appurtenances.
- 5. Pipes
- 6. Disinfection reports and practices
- 7. Product Data: Submit manufacturer's technical product data and installation instructions for fire water system materials and products.
- 8. Maintenance Data: Submit maintenance data and parts lists for fire water system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual.

# B. Shop Drawings: For the following:

- 1. Thrust Blocks: Include plans, elevations, sections, details, and forces for thrust blocks for each size of pipe and type of bend.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping and sewer system piping. Indicate interface and spatial relationship between piping and proximate structures.
- D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Field quality-control test reports.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

## 1.7 PROJECT CONDITIONS

- A. Interruption of Water Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect, Construction Manager, and Owner no fewer than two days in advance of proposed interruption of service. Coordinate interruptions during weekly meetings and at pre-construction meeting.
  - 2. Do not proceed with interruption of service without Architect's, Construction Manager's, and Owner's written permission.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.
- 2. Line Markers:
  - a. Allen Systems Inc.
  - b. Seton Name Plate Corp.
  - c. Engineer Approved Equal.
- 3. Pipe Strainers:
  - a. "Automatic" Sprinkler Corp. of America; Div. A-T-O Inc.
  - b. Cleveland Gear Co.; Sub of Vesper Corp.
  - c. Grinnell Fire Protection Systems Co., Inc.
  - d. Hersey Products Inc.; Hersey Div.
  - e. Mueller Steam Specialty; Div. of Core Industries Inc.
  - f. Neptune Water Meter Co.
  - g. Rockwell International Corp.; Municipal & Utility Div.
  - h. Rockwood Systems Corp.
  - i. Zurn Industries Inc.; Fluid Handling Div.
- 4. Detector Meter: Not Required
- Gate Valves:
  - a. American Valve Mfg. Corp.
  - b. American-Darling Valve; Div. of American Cast Iron Pipe Co.
  - c. Clow Corp.; Valve Div.
  - d. Dresser Mfg. Div. of ITT Grinnell Valve Co. Inc.
  - e. Fairbanks Co.
  - f. Kennedy Valve; Div. of ITT Grinnell Valve Co., Inc.
  - g. Stockham Valves & Fittings Inc.
  - h. United Brass Works Inc.
  - i. United States Pipe and Foundry Co.
  - j. Waterous Co.
- 6. Check Valves:
  - a. American-Darling Valve; Div. of American Cast Iron Pipe Co.
  - b. Clow Corp.; Valve Corp.
  - c. Fairbanks Co.
  - d. Kennedy Valve; Div. of ITT Grinnell Valve Co., Inc.
  - e. Mueller Co.
  - f. Nibbco Inc.
  - g. Stockham Valves & Fittings Inc.
  - h. Walworth Co.
  - Waterous Co.
- 7. Yard Hydrants
  - a. Josam Mfg. Co.
  - b. Smith (Jay R.) Mfg. Co.
  - c. Zern Industries, Inc.; Hydromechanics Div.
- 8. Fire Hydrants: Approved by authority having jurisdiction.
- 9. Backflow Preventors: Approved by authority having jurisdiction.

## 2.2 IDENTIFICATION

A. Underground –Type Plastic Line Markers: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".

WATER UTILITY PIPING

B. Nonmetallic Piping Label: If nonmetallic piping is used for water service, provide engraved plastic laminate, label permanently affixed to main electrical meter panel stating "THIS STRUCTURE HAS A NONMETALLIC WATER SERVICE".

## 2.3 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.
- B. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in potable water systems. Where more than one type of materials or products are indicated, selection is Installer's option.
- C. Piping: Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.
- D. Ductile Iron Pipe: Polyethylene wrapped Ductile Iron Class 350, with cement mortar lining complying with AWWA C104.
  - Fitting: Ductile iron AWWA C110; cement lined AWWA C104; and rubber-gasket joints, AWWA C111.
- E. PVC Pipe: AWWA C900 Class 200 Pipe for gasketed joints and using ASTM F 477, elastomeric seals.
  - 1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
  - 2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.

#### 2.4 WATER METER

- A. Water Meter, Meter Set and lid will be provided by water purveyor after payment of connection fees.
- B. Contractor to supply concrete meter box and accessories needed to make installation of water meter.

#### 2.5 VALVES

- A. Gate Valves: UL-listed, 175 psi working pressure for 12" and smaller, 150 psi for sizes larger than 12". Threaded, flanged, hub, or other end configurations to suit size of valve and piping connection. Inside screw type for use with indicator post, iron body bronze mounted, non-rising stem, solid wedge disc.
- B. Check Valves: UL-listed, 175 psi working pressure for 2" through 12", 150 psi for sizes larger than 12". Swing type, iron body bronze mounted with metal-to-metal or rubber-faced checks. Threaded, flanged, or hub end, to suit size and piping connections.

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# 2.6 FIRE HYDRANT

- A. Provide cast-iron body fire hydrants, compression type, opening against pressure and closing with pressure, base valve design, 200 psi working pressure, with 1/4" gage tapping and bronze plug in standpipe, conforming to the latest edition of AWWA C-502, "Dry Barrel Fire Hydrants." Hydrants shall be of the type required by the local water purveyor in who's jurisdiction the hydrant is being installed.
- B. Features: Provide the following features:
  - 1. Size: 5" valve opening.
  - 2. Direction to Open Hydrant: Left.
  - 3. Size and Shape of Operating and Cap Nuts: Pentagon 1-1/2" point to flat.
  - 4. Hose Nozzles: 2-1/2" National Standard Thread cap and chain.
  - 5. Pumper Nozzles: 5" National Standard Thread cap and chain.
  - 6. Depth of Trench: 4'-6".
  - 7. Connnection to Main: 6" mechanical joint.

# 2.7 ACCESSORIES

- A. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.
- B. Clamps, Straps, and Washers: Steel, ASTM A 506.
- C. Rods: Steel, ASTM A 575.
- D. Rod Couplings: Malleable-iron, ASTM A 197.
- E. Bolts: Steel, ASTM A 307.
- F. Cast-Iron Washers: Gray-iron, ASTM A 126.
- G. Thrust Restraints: All joints requiring a thrust blocking shall also be secured with mechanical joint restraints in addition to thrust blocks. Mega-Lug type fittings are acceptable upon submittal and approval by the engineer. Concrete shall be, 3,000 psi. AWWA compliant or as otherwise noted in drawings or by the local water purveyor, whichever is more stringent.

## 2.8 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - Water: Potable.
- B. Thrust Blocks, Hydrant Supports, and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio. All water pipe shall be secured at horizontal and vertical bends, tees, plugged tees, reducers and plugs with both thrust blocks and a mechanical joint restraint appropriate for pipe material being installed.

## PART 3 - EXECUTION

3.1 Examination: Examine areas and conditions under which potable water system's materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

#### 3.2 EARTHWORK

A. Excavation trenching, and backfilling are specified in Division 31 Section "Earth Moving."

## 3.3 INSTALLATION

A. Identification: During back-filling/top-soiling of underground fire water piping systems, install continuous underground-type plastic line marker, located directly over buried line at 6" to 8" below finished grade. If pvc pipe is used, install a tracer wire along the top of the pipe, secured with tape, and extending to fire hydrants and valves.

# B. Pipe and pipe fittings:

- 1. Pipe: Install in accordance with AWWA C600 "Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances".
- 2. Depth of Cover: Provide minimum depth of cover over underground piping in accordance with NFPA 24, Figure A-8-11 "Recommended Depth of Cover Above Top of Underground Yard Mains" or 60" below finish grade, whichever is greater.

## C. Piping Specialties:

- 1. Pipe Line Strainers: Install as indicated, with valved blowoff piped to drain.
- D. Meters: Install as indicated with shutoff valve on either side of meter and valved bypass full line size.
- E. Valves: Provide post indicator for control valves.
  - 1. Shutoff Valves: Install shutoff valve ahead of each hydrant.
- F. Hydrants: Install fire hydrants in accordance with AWWA M17 "Installation, Operation, and Maintenance of Fire Hydrants".
  - 1. Location: Install fire hydrants minimum of 40'-0" from building outside wall, as indicated, or if not shown.
  - 2. Face hydrants towards drive.
  - 3. Place hydrants so that base of hydrant is even to 6-inches above adjacent top back of curb.

## 3.4 PIPING APPLICATIONS

# A. Pipe:

- 1. Ductile Iron Pipe: Install in accordance with AWWA C600 "standard for installation of ductile-iron water mains and their appurtenances" and in accordance with instructions from water purveyor.
- 2. Copper Tube: Install in accordance with CDA "Copper Tube Handbook".
- 3. PVC Pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.

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- B. Depth of Cover: Provide minimum cover over piping of 12" below average local frost depth or 42" below finished grade, whichever is greater.
- C. Water Main Connection: Arrange and pay for tap in water main, of size and in location as indicated, from water Purveyor.
- D. Water Service Termination: Terminate potable water piping 5'-0" from building foundation in location and invert as indicated. Provide temporary pipe plug for piping extension into building.
  1. Mark location with surface marker.

#### 3.5 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground water pipes. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- C. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- D. Install piping according to the following:
  - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 2. Install piping with line and grade as indicated or below frost line if not inidcated.
  - 3. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
  - 4. Install ductile-iron special fittings according to AWWA C600.
  - Install PVC pressure piping according to AWWA M23 or ASTM D 2774 and ASTM F 1668.
  - 6. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.

#### 3.6 INSTALLATION OF VALVES

A. Install valves with stems pointing up. Provide valve box over underground valves.

#### 3.7 INSTALLATION OF WATER METER AND VAULT

A. Install Water Meter and Vault to comply with City Water Department Standards.

# 3.8 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join pressure piping according to the following:

- Join ductile-iron pressure piping according to AWWA C660 or AWWA M41 for push-on ioints.
- 2. Join ductile-iron special fittings according to AWWA C660 or AWWA M41 for push-on joints.
- 3. Join PVC pressure piping according to AWWA M23 for gasketed joints.
- 4. Join PVC water-service piping according to ASTM D 2855 for solvent-cemented joints.
- C. Join dissimilar pipe materials with pressure-type couplings.

## 3.9 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered, and after thrust blocks have sufficiently hardened. Fill pipeline with water 24-hrs prior to testing, and apply test pressure to stabilize system.
- B. Hydrostatic Tests: Test at not less than 200 psi for 2-hrs, or at 50 psi above maximum static pressure if it is greater than 150 psi.
  - 1. Test fails if leakage exceeds 2-qts per hour per 100 gaskets or joints irrespective of pipe diameter.
  - 2. Increase pressure in 50 psi increments and inspect each joint between increments. Hold at test pressure for one hour, decrease to 0 psi. Slowly increase again to test pressure and hold for one more hour.
- C. Operating Tests: Open and close all valves and hydrants under system water pressure. Check dry barrel hydrants for proper drainage.
  - 1. For systems with fire pumps, run pumps during operating tests.

## 3.10 ADJUSTING AND CLEANING

- A. Disinfection of Potable Water System: Flush pipe system with clean potable water until no dirty water appears at point of outlet. Fill system with water-chlorine solution containing at least 50 ppm of chlorine. Valve off system and let stand for 24- hrs minimum. Flush with clean potable water until no chlorine remains in water coming from system.
  - 1. Repeat procedure if contamination is present in bacteriological examination.
- B. Disinfection of Water Mains: Flush and disinfect in accordance with AWWA C651 "Standard for Disinfecting Water Mains".
  - 1. Contractor shall submit written verification to Project Manager stating, Disinfection has been completed in strict compliance with specification for this project and with jurisdiction having authority over water system.

## 3.11 ADJUSTING AND CLEANING

- A. Flushing: Flush underground mains and lead-in connections to sprinkler risers before connection is made to sprinklers, standpipes, or other fire protection system piping.
  - 1. Flush at flow rate not less than that indicated in NFPA 24, or at hydraulically calculated water demand rate of the system, whichever is greater.
- B. Adjusting: adjust fire hydrants to face street and be have base 2-6 inches above adjacent curb and gutter.

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# 3.12 CLOSING ABANDONED WATER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
  - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Backfill to grade according to Division 31 Section "Earth Moving."

**END OF SECTION 331100** 

WATER UTILITY PIPING

## SECTION 333100 - SANITARY SEWERAGE PIPING

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes gravity-flow, nonpressure sanitary sewerage outside the building, with the following components:
  - 1. Special fittings for expansion and deflection.
  - 2. Cleanouts.
  - 3. Drains.
  - 4. Precast concrete manholes.
  - 5. Cast in place manhole bases over existing pipes.
  - 6. Sewerage Pipes.

## 1.3 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

#### 1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Sewer-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least water tight under specified head, unless otherwise indicated.

## 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Special pipe fittings.
  - 2. Cleanout materials.
  - 3. Pipes.
- B. Shop Drawings: For the following:
  - 1. Manholes: Include plans, elevations, sections, details, and frames and covers. Include design calculations, and concrete design-mix report for cast-in-place manholes.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

- D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 60 feet and vertical scale of not less than 1 inch equals 8 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Field quality-control test reports.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

#### 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect, Construction Manager and Owner no fewer than two days in advance of proposed interruption of service. Coordinate interruptions during weekly meetings and at pre-construction meeting.
  - 2. Do not proceed with interruption of service without Architect's, Construction Manager's, and Owner's written permission.
  - 3. If shutdown will affect city streets, other city utilities, or city sewer line, do not proceed without approval from city and local sanitary sewer purveyor.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements.
  - 2. Backfill Material shall comply with section 312000 Earthwork and or the local sewage purveyors requirement. The contractor shall assume availability of acceptable material on the site at their own risk. No additional payment will be made for imported backfill should it be required.

#### 2.2 PIPING MATERIALS - PVC PIPE AND FITTINGS

- A. PVC Pressure Pipe: AWWA C900, Class 150 for gasketed joints and using ASTM F 477, elastomeric seals.
  - 1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.

- 2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.
- B. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 80 pipe, with plain ends for solvent-cemented joints with ASTM D 2467, Schedule 80, socket-type fittings.
- C. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- D. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T 2 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- E. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

#### 2.3 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Use non-pressure type couplings only when pipes can not be connected together with standard fittings and typical pipe connections such as bell and spigot. If possible, file the end on existing pipes to create spigot type connections to match existing pipe ends for connection to a new bell for an extension of the pipe.
- B. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- C. Sleeve Materials:
  - 1. For Concrete Pipes: ASTM C 443, rubber.
  - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
  - 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- D. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Manufacturers:
    - a. Dallas Specialty & Mfg. Co.
    - b. Fernco Inc.
    - c. Logan Clay Products Company (The).
    - d. Mission Rubber Company; a division of MCP Industries, Inc.
    - e. NDS Inc.
    - f. Plastic Oddities, Inc.
- E. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Manufacturers:
    - a. Cascade Waterworks Mfg.
    - b. Dallas Specialty & Mfg. Co.

- c. Mission Rubber Company; a division of MCP Industries, Inc.
- F. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
  - 1. Manufacturers:
    - a. Fernco Inc.
    - b. Logan Clay Products Company (The).
    - c. Mission Rubber Company; a division of MCP Industries, Inc.
- G. Split-Sleeve Couplings: With split sleeve with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
  - Manufacturers:
    - Brico Industries.
  - 2. Sleeve Material: Manufacturer's standard.
  - 3. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
  - 4. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
  - 5. Metal Component Finish: Corrosion-resistant coating or material.

#### 2.4 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  - 1. Manufacturers:
    - a. Josam Company.
    - b. MIFAB Manufacturing, Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Wade Div.; Tyler Pipe.
    - e. Watts Industries, Inc.
    - f. Watts Industries, Inc.; Enpoco, Inc. Div.
    - g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
  - 2. Top-Loading Classification(s): Light, Medium, Heavy, and Extra-heavy duty depending on location and expected driving load on cleanout.
  - 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Place in grey iron housing with clamping device and round, secured, scoriated, gray-iron cover.
  - 1. Manufacturers:
    - Canplas Inc.
    - b. Josam Company
    - c. MIFAB Manufacturing, Inc.
    - d. Wad Div.; Tyler Pipe
    - e. Watts Industries, Inc.

- f. Zern Industries, Inc; Zern Specification Drainage Operation
- g. IPS Corporation.
- h. NDS Inc.
- i. Plastic Oddities, Inc.
- j. Sioux Chief Manufacturing Company, Inc.
- k. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.

#### 2.5 MANHOLES

- A. Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 1. Diameter: 48 inches minimum, unless otherwise indicated and as needed for pipe sizes.
  - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  - 3. Base Section: 9-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
  - 4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
  - 5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  - 6. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  - 7. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
  - 8. Steps: Not used.
  - 9. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
  - 10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.
  - 11. Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
    - a. Material: ASTM A 536, Grade 60-40-18 ductile or ASTM A 48, Class 35 gray iron, unless otherwise indicated and to match existing manhole frames and covers.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 15-mil minimum thickness applied to all surfaces, unless otherwise indicated.
- B. Cast-in-Place Concrete Manholes Base: Construct of reinforced-concrete bottom according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
  - 1. Ballast: Increase thickness of concrete, as required to prevent flotation.
  - 2. Excavate around existing pipe where manhole is to be placed.
  - 3. Place new pipe stub at line and grade and stubbed into new manhole location with pipe extending towards existing pipes.
  - 4. Place CMU blocks or other approved support adjacent to pipes to support new barrel section.
  - 5. Set first barrel section on CMU blocks and verify that barrel section is level in all directions and is not sitting on pipes.
  - 6. Make sure that hole is deep enough that the depth of concrete will be 9-inches below existing and new pipes.

- 7. Place concrete around barrel section and inside barrel section so that the existing and new pipes are at least 50% covered with concrete.
- 8. Hand form trough as needed.
- 9. Let concrete cure and break out of pipes for trough. Grout all troughs smooth and even with pipes.
- 10. Stack remaining barrel sections and add cone, ring and cover etc. as indicated for precast manhole.

#### 2.6 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

#### PART 3 - EXECUTION

#### 3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

#### 3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
  - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
    - a. Flexible or rigid couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- C. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:
  - 1. PVC sewer pipe and fittings; gaskets; and gasketed joints.
  - 2. Ductile-iron pressure pipe, ductile-iron standard or compact fittings, gaskets, and gasketed joints.
  - 3. PVC pressure, PVC pressure fittings, gaskets, and gasketed joints.

#### 3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow, at slope indicated.
  - 2. Install piping with restrained joints at tee fittings and at changes in direction for pressure pipe. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 3. Install piping with cover indicated.
  - Notify engineer of clearance problems that would result in changes to grade and alignment.
  - 5. Install ductile-iron culvert piping according to ASTM A 716.
  - 6. Install ductile-iron and special fittings according to AWWA C600 or AWWA M41.
  - 7. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  - 8. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

#### 3.4 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
  - Join ductile-iron culvert piping according to AWWA C600 for push-on joints.

- 2. Join ductile-iron and special fittings according to AWWA C600 or AWWA M41.
- 3. Join PVC cellular-core piping according to ASTM D 2321 and ASTM F 891 for solvent-cement joints.
- 4. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomericseal joints or ASTM D 3034 for elastomeric gasket joints.
- 5. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
- 6. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
- C. Join dissimilar pipe materials with pressure-type couplings.

#### 3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use same pipe type as sewer line that the cleanout is connected to. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  - 2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
  - 3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
  - 4. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 12 inches around outside of cover. At contractors option, a square block can be used that is at least 12-inches wider that the cover. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

#### 3.6 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections according to ASTM C 891.
- C. Construct cast-in-place manhole bases as indicated.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

#### 3.7 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

#### 3.8 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary sewer system.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

#### 3.9 CLOSING ABANDONED SEWER DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
  - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
  - 1. Remove manhole or structure and close open ends of remaining piping.
  - Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Division 31 Section "Earth Moving."

#### 3.10 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
  - 1. Use warning tape or detectable warning tape over ferrous piping.
  - Use detectable warning tape over nonferrous piping and over edges of underground structures.

#### 3.11 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  - 1. Submit separate reports for each system inspection.
    - a. Reports shall include a video log of storm drain showing all lineal footage of the system in DVD format. Log shall be submitted to the owner once a month. A final log shall be submitted with the as built drawing for the use of the owner and Architect.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.

- e. Exfiltration: Water leakage from or around piping.
- f. Test for infiltration or exfiltration between manholes as follows:
  - 1) Clean section of sewer line of dirt. Debris, gravel, rocks and other items.
  - 2) Fill section between manholes with water. Allow water to sit in pipe for not less than 3-hours to acclimate to surrounding earth temperature.
  - 3) Use a water pump to pressurize the sewer pipe section to not less than 5 psi and not more than 10 psi. Record starting pressure.
  - 4) Turn off water pressure and wait 20 minutes.
  - 5) Refill pipe to same pressure as in step 3 and measure volume required to fill pipe to same pressure.
  - 6) Pipe section passes test if volume required to refill pipe is less than ½-gallon per 400 feet of 8-inch pipe. Prorate the allowable seepage larger or smaller pipes and for shorter or longer distances.
  - 7) Find and fix leaks in any section that fails to pass test. Fix any visible leaks found even if section of pipe passes test.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  - 4. Submit separate report for each test.

#### 3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

**END OF SECTION 333100** 

#### SECTION 334100 - STORM UTILITY DRAINAGE PIPING

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
  - 1. Special fittings for expansion and deflection.
  - 2. Cleanouts.
  - 3. Drains.
  - 4. Precast concrete manholes, inlet boxes, catch basins.
  - 5. Cast in place inlet boxes and catch basins and manhole bases over existing pipes.

#### 1.3 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. CP: Non-reinforced concrete pipe.
- C. RCP: Reinforced concrete pipe.

#### 1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

#### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Special pipe fittings.
  - 2. Drains.
  - 3. Storage.
  - 4. Pipes.
- B. Shop Drawings: For the following:
  - 1. design calculations, and concrete design-mix report for cast-in-place manholes.

- 2. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
- 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Field quality-control test reports.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

#### 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect, Construction Manager, and Owner no fewer than two days in advance of proposed interruption of service. Coordinate interruptions during weekly meetings and at pre-construction meeting.
  - 2. Do not proceed with interruption of service without Architect's, Construction Manager's, and Owner's written permission.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include local pre-cast manufacturers but are subject to approval of the engineer and architect.

#### 2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

#### 2.3 PVC PIPE AND FITTINGS

- A. PVC Pressure Pipe: AWWA C900, Class 150 for gasketed joints and using ASTM F 477, elastomeric seals.
  - 1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
  - 2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.
- B. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 80 pipe, with plain ends for solvent-cemented joints with ASTM D 2467, Schedule 80, socket-type fittings.
- C. PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness pipe with ASTM D 3034, SDR 35, socket-type fittings for solvent-cemented joints.
- D. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- E. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T 2 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- F. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

#### 2.4 CONCRETE PIPE AND FITTINGS

- A. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14, Class I, II or III, with bell-and-spigot ends and gasketed joints with ASTM C 443, rubber gaskets.
- B. Piping in paragraph below is available in 5 classes and 3 wall thicknesses, and in NPS 12 to NPS 144. Not all classes and wall thicknesses are available. Joints are gasket type. Contractor, at his option, may use non-reinforced pipe for sizes up to 21-inches if structural requirements based on load on pipe are not exceeded for that pipe. If reinforced pipe is selected, choose the pipe class and wall thickness to suit availability and structural requirements based on loads and cover.
- C. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with bell-and-spigot ends and gasketed joints with ASTM C 443, rubber gaskets.
  - 1. Class I
  - 2. Class II
  - 3. Class III

#### 2.5 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Concrete Pipes: ASTM C 443, rubber.
  - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
  - 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Manufacturers:
    - a. Dallas Specialty & Mfg. Co.
    - b. Fernco Inc.
    - c. Logan Clay Products Company (The).
    - d. Mission Rubber Company; a division of MCP Industries, Inc.
    - e. NDS Inc.
    - f. Plastic Oddities, Inc.
- D. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Manufacturers:
    - a. Cascade Waterworks Mfg.
    - b. Dallas Specialty & Mfg. Co.
    - c. Mission Rubber Company; a division of MCP Industries, Inc.
- E. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
  - 1. Manufacturers:
    - a. Fernco Inc.
    - b. Logan Clay Products Company (The).
    - c. Mission Rubber Company; a division of MCP Industries, Inc.

#### 2.6 PRESSURE-TYPE PIPE COUPLINGS

A. Reducing or transition, metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include 150-psig minimum pressure rating and ends of same sizes as piping to be joined.

- B. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners.
  - 1. Manufacturers:
    - a. Cascade Waterworks Mfg.
    - b. Dresser, Inc.; DMD Div.
    - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
    - d. JCM Industries.
    - e. Romac Industries, Inc.
    - f. Smith-Blair, Inc.
    - g. Viking Johnson.
  - 2. Center-Sleeve Material: Manufacturer's standard.
  - 3. Gasket Material: Natural or synthetic rubber.
  - 4. Metal Component Finish: Corrosion-resistant coating or material.
- C. Split-Sleeve Couplings: With split sleeve with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
  - Manufacturers:
    - a. Brico Industries.
  - 2. Sleeve Material: Manufacturer's standard.
  - 3. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
  - 4. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
  - 5. Metal Component Finish: Corrosion-resistant coating or material.

#### 2.7 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include 2 gasketed ball-joint sections and 1 or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.
  - 1. Manufacturers:
    - a. EBAA Iron Sales, Inc.
    - b. Romac Industries, Inc.
    - c. Star Pipe Products.
- B. Ductile-Iron Deflection Fittings: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.
  - 1. Manufacturers:
    - a. EBAA Iron Sales, Inc.
- C. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or

AWWA C153. Include rating for 250-psig minimum working pressure and for expansion indicated.

- 1. Manufacturers:
  - a. Dresser, Inc.; DMD Div.
  - b. EBAA Iron Sales, Inc.
  - c. JCM Industries.
  - d. Smith-Blair, Inc.

#### 2.8 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  - 1. Manufacturers:
    - a. Josam Company.
    - b. MIFAB Manufacturing, Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Wade Div.; Tyler Pipe.
    - e. Watts Industries, Inc.
    - f. Watts Industries, Inc.; Enpoco, Inc. Div.
    - g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
  - 2. Top-Loading Classification(s): Light, Medium, Heavy, and Extra-heavy duty depending on location and expected driving load on cleanout.
  - 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Place in grey iron housing with clamping device and round, secured, scoriated, gray-iron cover.
  - 1. Manufacturers:
    - a. Canplas Inc.
    - b. IPS Corporation.
    - c. NDS Inc.
    - d. Plastic Oddities, Inc.
    - e. Sioux Chief Manufacturing Company, Inc.
    - f. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.

#### 2.9 DRAINS

- A. Gray-Iron Area Drains: ASME A112.21.1M, round body with anchor flange and round secured grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
  - 1. Manufacturers:

- a. Josam Company.
- b. MIFAB Manufacturing, Inc.
- c. Smith, Jay R. Mfg. Co.
- d. Wade Div.; Tyler Pipe.
- e. Watts Industries, Inc.
- f. Watts Industries, Inc.; Enpoco, Inc. Div.
- g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
- 2. Top-Loading Classification(s): Medium and heavy duty depending on location and expected driving load.
- B. Gray-Iron Trench Drains: ASME A112.21.1M, 6-inch to 12-inch-wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular secured grate. Include units of total length indicated and number of bottom outlets with inside calk or spigot connections, of sizes indicated.
  - 1. Manufacturers:
    - a. Josam Company.
    - b. Smith, Jay R. Mfg. Co.
    - c. Wade Div.; Tyler Pipe.
    - d. Watts Industries, Inc.
    - e. Watts Industries, Inc.; Enpoco, Inc. Div.
    - f. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
    - g. Poly Drain, ABT
  - 2. Top-Loading Classification(s): Medium, heavy, and extra-heavy duty.

#### 2.10 MANHOLES

- A. Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 1. Diameter: 48 inches minimum, unless otherwise indicated and as needed for pipe sizes.
  - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  - 3. Base Section: 9-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
  - 4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
  - 5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  - 6. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  - 7. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
  - 8. Steps: Not used.
  - Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
  - Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.

- 11. Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
  - a. Material: ASTM A 536, Grade 60-40-18 ductile or ASTM A 48, Class 35 gray iron, unless otherwise indicated and to match existing manhole frames and covers.
  - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 15-mil minimum thickness applied to all surfaces, unless otherwise indicated.
- B. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
  - 1. Ballast: Increase thickness of concrete, as required to prevent flotation.
  - 2. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
  - 3. Steps: Not used.
  - 4. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
  - 5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.
  - 6. Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
    - a. Material: ASTM A 536, Grade 60-40-18 ductile or ASTM A 48, Class 35 gray iron, unless otherwise indicated and to match existing frames and covers.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint 15-mil minimum thickness applied to all surfaces, unless otherwise indicated.

#### 2.11 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33. crushed gravel.
  - Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

#### 2.12 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

A. Description, General: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include number of units required to form total lengths indicated.

#### B. Manufacturers:

- 1. ABT, Inc.
- 2. ACO Polymer Products, Inc.
- 3. Innovative Plastics Products. Inc.
- 4. Mea-Josam Div.; Josam Company.
- 5. Strongwell; Lenoir City Div.
- C. Sloped-Invert, Polymer-Concrete Systems: Include the following components:
  - 1. Channel Sections: Interlocking-joint, precast, modular units with end caps. Include inside width and depth as indicated with rounded bottom, with built-in invert slope of 0.6 percent and with outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.
    - a. Frame: Include gray-iron or steel frame for grate.
  - 2. Grates with manufacturer's designation "Heavy Duty," with slots or perforations that fit recesses in channels.
    - a. Material: Gray iron.
  - 3. Covers: Solid gray iron, if indicated.
  - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Narrow-Width, Level-Invert, Polymer-Concrete Systems: Include the following components:
  - 1. Channel Sections: Interlocking-joint, precast, modular units with end caps. Include 5-inch inside width and 9-3/4-inch deep, rounded bottom, with level invert and with NPS 4 outlets in number and locations indicated.
  - 2. Grates with slots or perforations that fit recesses in channels.
    - a. Material: Gray iron.
  - 3. Covers: Solid gray iron, if indicated.
  - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- E. Wide-Width, Level-Invert, Polymer-Concrete Systems: Include the following components:
  - 1. Channel Sections: Interlocking-joint, precast, modular units with end caps. Include 8-inch inside width and 13-3/4-inch-deep, rounded bottom, with level invert and with outlets in number, sizes, and locations indicated.
  - 2. Grates with slots or other openings that fit recesses in channels.
    - a. Material: Gray iron.

- 3. Covers: Solid gray iron, if indicated.
- 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- F. Supports, Anchors, and Setting Devices: Manufacturer's standard, unless otherwise indicated.
- G. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

#### 2.13 CATCH BASINS

- A. Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor
  - 2. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
  - 3. Top Section: Flat-slab-top type with hole for frame and grate is indicated.
  - 4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  - Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
  - 6. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match frame and grate.
  - 7. Steps: Not Used.
  - 8. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section. Size sections and box or manhole to fit pipes without necessary.
  - 9. Catch basins shall be provided by the contractor in an appropriate size to accommodate the pipe size, material, flow lines and arrangement as shown on the plans.
- B. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated.
  - 1. Bottom, Walls, and Top: Reinforced concrete.
  - 2. Channels and Benches: Concrete.
  - 3. Steps: Not used.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for H-20, structural loading. Include flat grate with small square or short-slotted drainage openings. All grates shall be bicycle proof. Grates installed in pedestrian areas shall be heel proof as determined by the manufacturer.
  - 1. Size: 24 by 24 inches minimum, unless otherwise indicated.
  - 2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

#### 2.14 STORMWATER INLETS

A. Gutter Inlets: Horizontal gutter opening, of materials and dimensions indicated. Include heavy-duty frames and grates. All grates to be bicycle safe.

B. Combination Inlets: Vertical curb and horizontal gutter openings, of materials and dimensions indicated. Include heavy-duty frames and grates.

#### 2.15 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregular size and shape, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size, graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

#### 2.16 DRY WELLS

- A. Description: ASTM C 913, precast, reinforced, perforated concrete manholes with ring and cover, frame and grate, or lid as indicated and include the following:
  - 1. Floor: Cast-in-place concrete support ring.
  - 2. Cover: Liftoff-type concrete cover with cast-in lift rings.
  - 3. Wall Thickness: 4 inches minimum with 1-inch diameter or 1-by-3-inch maximum slotted perforations arranged in rows parallel to axis of ring.
    - a. Total Free Area of Perforations: Approximately 15 percent of ring interior surface.
    - b. Ring Construction: Designed to be self-aligning.
  - 4. Filtering Material: ASTM D 448, Size No. 24, 3/4- to 2-1/2-inch washed, crushed stone or gravel. The % of material passing the # 200 sieve shall not exceed 5%.

#### PART 3 - EXECUTION

#### 3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

#### 3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
  - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
    - a. Flexible or rigid couplings for same or minor difference OD pipes.

- Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.
- c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- 2. Use pressure-type pipe couplings for force-main joints.
- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- C. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:
  - 1. PVC water-service pipe; PVC Schedule 40, water-service-pipe fittings; and solvent-cemented joints.
  - 2. PVC sewer pipe and fittings; gaskets; and gasketed joints.
  - 3. Class [1] [2] [3], nonreinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
  - 4. Ductile-iron culvert pipe, ductile-iron standard or compact fittings, gaskets, and gasketed joints.
  - 5. Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
  - 6. Corrugated steel pipe and fittings, standard and special-joint bands, and banded joints.
  - 7. Corrugated aluminum pipe and fittings, standard and special-joint bands, and banded joints.
  - 8. Corrugated PE pipe and fittings, silttight couplings, and coupled joints.

#### 3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow, at slope indicated.

- 2. Install piping with restrained joints at tee fittings and at changes in direction for pressure pipe. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
- 3. Install piping with cover indicated.
- 4. Notify engineer of clearance problems that would result in changes to grade and alignment.
- 5. Install PVC cellular-core piping according to ASTM D 2321 and ASTM F 1668.
- 6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- 7. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- 8. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- 9. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install force-main pressure piping according to the following:
  - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 2. Install piping with line and grade as indicated or below frost line if not inidcated.
  - 3. Install PVC pressure piping according to AWWA M23 or ASTM D 2774 and ASTM F 1668.
  - 4. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.

#### 3.4 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
  - 1. Join PVC cellular-core piping according to ASTM D 2321 and ASTM F 891 for solvent-cement joints.
  - 2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
  - 3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
  - 4. Join nonreinforced-concrete sewer piping according to ASTM C 14and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
  - 5. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
  - 6. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
- C. Join dissimilar pipe materials with pressure-type couplings.

#### 3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use same pipe type as sewer line that the cleanout is connected to. Install piping so cleanouts open in direction of flow in sewer pipe.

- 1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
- 2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
- 3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
- 4. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 12 inches around outside of cover. At contractors option, a square block can be used that is at least 12-inches wider that the cover. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

#### 3.6 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
  - 1. Use heavy-duty, top-loading classification drains in vehicle-traffic service areas, earth or unpaved foot-traffic areas and paved foot-traffic areas.
  - 2. Use extra-heavy-duty, top-loading classification drains in roads areas.
- B. Embed drains in 4-inch minimum depth of concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

#### 3.7 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections according to ASTM C 891.
- C. Construct cast-in-place manholes as indicated.
- D. Install PE sheeting on earth where cast-in-place-concrete manholes are to be built.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

#### 3.8 CATCH BASIN INSTALLATION

- A. Construct catch basins in an appropriate size to accommodate the pipe size, material, flow lines and arrangement as shown on the plans.
- B. Set frames and grates to elevations indicated.
- C. Align boxes so that frame and grates are square to adjacent sidewalks, curbs or roadways.

#### 3.9 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.
- F. Place cast-in-place concrete according to ACI 318/318R.

#### 3.10 DRAINAGE SYSTEM INSTALLATION

- A. Assemble and install components according to manufacturer's written instructions.
- B. Install with top surfaces of components, except piping, flush with finished surface.
- C. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- D. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- E. Fasten grates to channel sections if indicated.
- F. Assemble channel sections with flanged or interlocking joints.
- G. Embed channel sections in 4-inch minimum concrete around bottom and sides.

#### 3.11 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping."
- B. Connect force-main pressure piping to building's storm drainage force mains specified in Division 22 Section "Facility Storm Drainage Piping." Terminate piping where indicated.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- C. Connect to sediment interceptors specified in Division 22 Section "Sanitary Waste Interceptors."

#### 3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
  - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
  - 1. Remove manhole or structure and close open ends of remaining piping.
  - 2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Division 31 Section "Earth Moving."

#### 3.13 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
  - 1. Use warning tape or detectable warning tape over ferrous piping.
  - Use detectable warning tape over nonferrous piping and over edges of underground structures.

#### 3.14 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  - 1. Submit separate reports for each system inspection.
    - a. Reports shall include a video log of storm drain showing all lineal footage of the system in DVD format. Log shall be submitted to the owner once a month. A final log shall be submitted with the as built drawing for the use of the owner and Architect.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.

- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  - 4. Submit separate report for each test.
  - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    - b. Option: Test plastic piping according to ASTM F 1417.
    - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

#### 3.15 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

**END OF SECTION 334100** 

#### SECTION 334600 - SUBDRAINAGE

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Perforated-wall pipe and fittings.
  - 2. Geotextile filter fabrics.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For geotextile filter fabrics.

#### PART 2 - PRODUCTS

#### 2.1 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

#### 2.2 SOIL MATERIALS

A. Soil materials are specified in Section 312000 "Earth Moving."

#### 2.3 WATERPROOFING FELTS

A. Material: Comply with ASTM D226, Type I, asphalt -saturated organic felt.

#### 2.4 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
  - 1. Survivability: AASHTO M 288 Class 2.
  - 2. Styles: Flat and sock.

#### PART 3 - EXECUTION

#### 3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

#### 3.2 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least 12 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least on side away from footing and above top of pipe to within 12 inches of finish grade.
- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 6 inches.
- J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

#### 3.3 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 12" or as shown in the project details.

- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least 12 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

#### 3.4 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
  - 1. Foundation Subdrainage: Install piping level and with a minimum cover of **36 inches** unless otherwise indicated or as shown in project details.
  - 2. Underslab Subdrainage: Install piping level.
  - 3. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.
  - 4. Lay perforated pipe with perforations down.
  - 5. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D2321.

#### 3.5 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings according to ASTM D3212 with loose banded, coupled, or push-on joints.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

#### 3.6 BACKWATER VALVE INSTALLATION

A. Comply with requirements for backwater valves specified in Section 334100 "Storm Utility Drainage Piping."

- B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.
- C. Install horizontal backwater valves in piping in manholes or pits or where indicated in the project plans.

#### 3.7 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for land drain Subdrainage:
  - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
  - 2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
  - 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above finish grade.
  - 4. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."

#### C. Cleanouts for Underslab Subdrainage:

- 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
- 2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

#### 3.8 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.
- C. Where required, connect low elevations of foundation subdrainage to stormwater sump pumps. Comply with requirements for sump pumps as specified by the Mechanical Engineer. Sump pump connections to solid wall piping in the storm drain system shall include a water tight connection and check valve for backflow prevention.

#### 3.9 FIELD QUALITY CONTROL

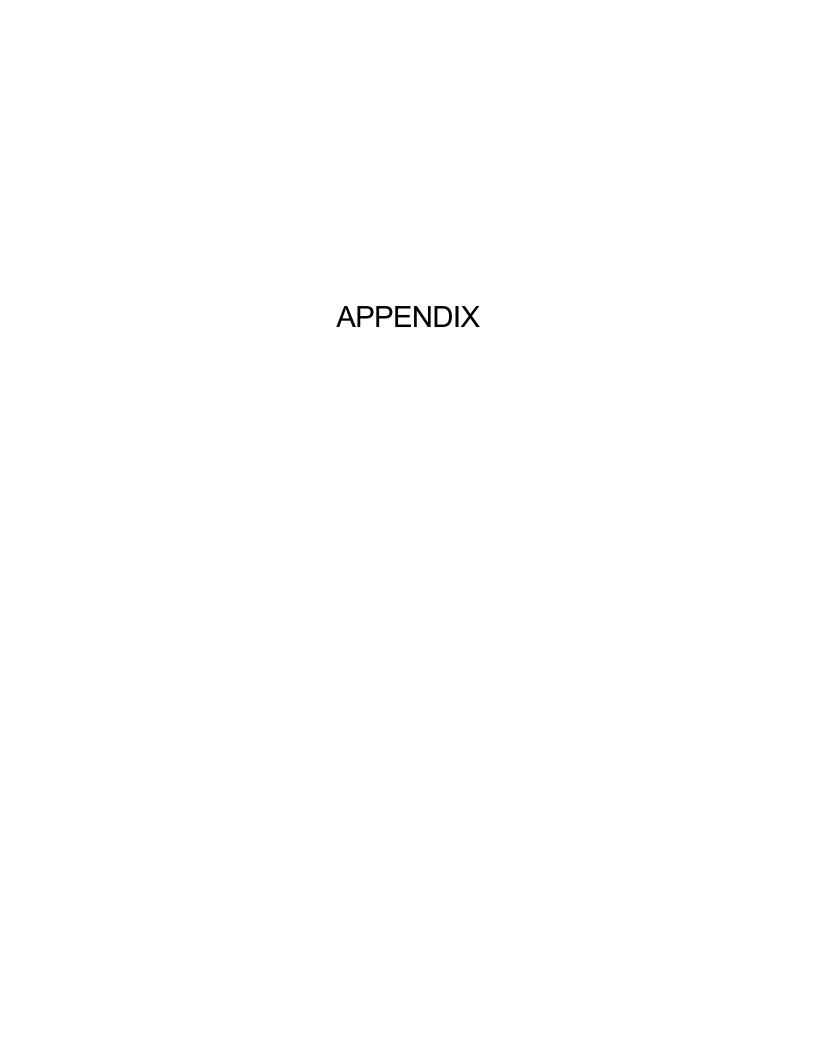
A. Tests and Inspections:

- 1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
- 2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.
- B. Drain piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

#### 3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600





### License and Indemnification Agreement

Project: MHTN Pr	oject No.:						
Instrume		obtain Drawings, Specifications, electronic data, and/or other ") produced by MHTN Architects, Inc. ("MHTN") for the above ver agree to the following:					
Receiver'	's authorized representative to	initial Receiver's assent to each term in the space provided.					
1.	Receiver's portion of the wor this license. MHTN retains its reproducible copies of the In	a non-exclusive license to the Information for production of the k for this project only. The Receiver shall not transfer or assign copyrights, the right to retain electronic data or other formation, and the right to use information, ideas, and/or formation in the normal course of the its professional activities.					
2.	<ol> <li>The Information is for information purposes only. Under no circumstances shall the conveyance of the Information be deemed a sale by MHTN. MHTN makes no warranties, express or implied, of merchantability or of fitness of the Information for a particular purpose.</li> </ol>						
3.	3. The Receiver shall remove all title blocks and other references to MHTN, MHTN's consultant and the project owner from the electronic data contained in the Information upon receipt.						
4.	The Receiver shall remove all notes, text, and detail cuts from the electronic data contained in the Information upon receipt.						
5.	consultants. The Receiver sha shall defend, indemnify, and he employees of any of them from	e at Receiver's sole risk and without liability to MHTN or its all make no claim against MHTN or its consultants. The Receiver old harmless MHTN, MHTN's consultants, and agents and m and against all claims, damages, losses, and expenses, torney fees and costs, arising out of the Receiver's use of the					
Receiver	Company Name:						
Officer &	Title (printed):						
Officer &	Title (signed):						
		Date:					
MHTN Ar	chitects, Inc.						
Represer	ntative & Title:						
Represer	ntative & Title (signed):						
		Date:					



# $\begin{array}{c} \text{SUBSTITUTION} \\ \text{REQUEST} \\ \text{(During the Bidding Phase)} \end{array}$

Project:		Substitution Request Number:
 To:		From: Date:
		A/E Project Number:
Re:		Contract For:
Specification 1	Title:	Description:
Sec	tion: Page:	Article/Paragraph:
Proposed Sub	stitution:	
Manufacturer:	Address:	Phone:
Trade Name:		Model No.:
Attached data a for its proper ins  The Undersigned Proposed su Same warrar Same mainte Proposed su Proposed su	aluation of the request; applicable portions of the also includes a description of changes to the Constallation.  I certifies: abstitution has been fully investigated and determine the furnished for proposed substitution as for enance service and source of replacement parts, as abstitution will have no adverse effect on other traded by the furnished for changes to building design, including I be made for changes to building design, including	ed to be equal or superior in all respects to specified product. r specified product. applicable, is available. es and will not affect or delay progress schedule
Submitted by:		
Signed by:		
Firm:		
Address:		
Telephone:		
<ul><li>☐ Substitution</li><li>☐ Substitution</li></ul>	AND ACTION approved - Make submittals in accordance with Sp approved as noted - Make submittals in accordanc rejected - Use specified materials. Request received too late - Use specified materials	e with Specification Section 013300.
Commonting D. I	Attacked D Drawing D Drawing	
Supporting Data	a Attached:   Drawings   Product Data	□ Samples □ Tests □ Reports □



## **SUBSTITUTION REQUEST** (After the Bidding Phase)

						(Tittel till	Diading	, i muse)
Project:				Substitution Re	equest Number	:		
				From:				
To:				Date:				
				A/E Project Nu	umber:			
Re:								
Specification Title:				_ Description:				
Section:	Page:			_ Article/Paragr	aph:			
Proposed Substitution:								
Manufacturer:					Phone:			
Trade Name:					_ Model No.:			
Installer:	Address	:			Phone:			
History: ☐ New product ☐	2-5 years old	□ 5-10	vrs old	☐ More than 10.	vears old			
Differences between proposed s	abstitution and s	specified p	roduct:					
-								
☐ Point-by-point comparative of	iata attached - R	EQUIREI	OBY A/E					
D 0 111 10								
Reason for not providing specifi	ed item:							
Similar Installation:								
Project:			Architec	t:				
Address:			Owner:					
				talled:				
Proposed substitution affects oth	ner parts of Wor	k∙ □ No	☐ Yes;	explain				
Troposed substitution directs of	for parts of World	a110		Capitani				
Savings to Owner for accepting	substitution:					(\$		).
Proposed substitution changes C	Contract Time:	☐ No		☐ Yes [Add]	[Deduct]			days.
Supporting Data Attached:	] Drawings	☐ Prod	uct Data	☐ Samples	☐ Tests	Reports		
				•		•		

## SUBSTITUTION REQUEST

(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become
  apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

<ul> <li>Coordination, installa</li> </ul>	ation, and changes in	the Work as necessar	y for accepted su	ibstitution will be comp	plete in all respects.
Submitted by:					
Signed by:					
Firm:					
Address:					
Telephone:					
Attachments:					
A/E s REVIEW AND A	- Make submittals in as noted - Make subr Use specified materia	nittals in accordance als.			Date:
Additional Comments:	☐ Contractor	☐ Subcontractor	Supplier	☐ Manufacturer	☐ A/E ☐